EPA/ROD/R05-89/086
1989

EPA Superfund
Record of Decision:

WAUSAU GROUND WATER CONTAMINATION
EPA ID: WID980993521
OU 01
WAUSAU, WI
12/23/1988

* CITY OF WAUSAU
* MARATHON ELECTRIC COMPANY
* WAUSAU CHEMICAL COMPANY
* WAUSAU ENERGY COMPANY
* AMOCO OIL CORPORATION

SEVERAL NEGOTIATION MEETINGS WERE HELD TO DISCUSS TECHNICAL AND LEGAL ISSUES OF A CONSENT DECREE FOR THE SITE. HOWEVER, DUE TO PROBLEMS WITHIN THE PRP GROUP, AND FAILURE OF THE PRPS TO AGREE TO KEY REQUIREMENTS, NEGOTIATIONS WERE UNSUCCESSFUL, AND THE PRPS DECLINED TO PARTICIPATE IN THE RI/FS. THE US EPA THEN CONTRACTED WITH WARZYN ENGINEERING, INC. TO CONDUCT THE RI/FS.

ALTHOUGH THE PRPS FAILED TO REACH AN AGREEMENT WITH US EPA, THEY HAVE MAINTAINED CONSIDERABLE INVOLVEMENT IN US EPA'S STUDY. TWO OF THE FIVE PRPS CONDUCTED AN INVESTIGATION OF THE WEST WELL FIELD AND ALL HAVE REQUESTED SPLIT SAMPLES AND/OR RESULTS OF DATA COLLECTED. IN ADDITION, TWO OF THE PRPS, THE CITY OF WAUSAU AND MARATHON ELECTRIC, OFFERED TO PERFORM THE PHASED FEASIBILITY STUDY (PFS), AND HAVE INDICATED A WILLINGNESS TO PERFORM THE OPERABLE UNIT REMEDIAL DESIGN/REMEDIAL ACTION (RD/RA). CORRESPONDENCE REGARDING THIS MATTER IS INCLUDED IN THE ADMINISTRATIVE RECORD FOR THE SITE.

IN JANUARY, 1988, US EPA FILED SUIT AGAINST FOUR OF THE PRPS FOR RECOVERY OF PAST COSTS SPENT ON US EPA'S EMERGENCY RESPONSE ACTIONS. A FIFTH PRP, AMOCO OIL, WAS NOT NAMED IN THE LAWSUIT BASED ON PROSECUTORIAL DISCRETION. TRIAL PROCEEDINGS ARE SCHEDULED TO BEGIN IN NOVEMBER 1989.

NEGOTIATIONS WITH THE PRPS ARE UNDER WAY FOR THE OPERABLE UNIT RD/RA. SPECIAL NOTICE LETTERS WERE SENT OUT ON OCTOBER 13, 1988 TO THE FIVE PRPS LISTED ABOVE. NEGOTIATIONS ARE PROCEEDING ACCORDING TO US EPA'S GENERAL GUIDANCE AND POLICIES. AS DISCUSSED ABOVE, TWO OF THE PRPS HAVE EXPRESSED A WILLINGNESS TO PERFORM THE RD/RA, AND ARE THE ONLY PRPS TO CONTINUE TO ATTEND THESE NEGOTIATIONS TO DATE.

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III. COMMUNITY RELATIONS

A RI/FS "KICK-OFF" PUBLIC MEETING WAS HELD IN SEPTEMBER 1987, TO INFORM THE LOCAL RESIDENTS OF THE SUPERFUND PROCESS AND THE WORK TO BE CONDUCTED. ISSUES RAISED DURING THE MEETING, ATTENDED MOSTLY BY PRP AGENTS AND CITY OFFICIALS, INCLUDED THE COST OF THE RI/FS, THE ESTIMATED TIME TO COMPLETE THE STUDY, AND THE NUMBER OF PREVIOUS STUDIES PERFORMED FOR THE SITE.

INFORMATION REPOSITORIES HAVE BEEN ESTABLISHED AT WAUSAU CITY HALL, 407 GRANT STREET, AND THE MARATHON COUNTY PUBLIC LIBRARY, 400 FIRST STREET, WAUSAU, WISCONSIN. IN ACCORDANCE WITH SECTION 113(K)(1) OF CERCLA, THE ADMINISTRATIVE RECORD FOR THE SITE IS AVAILABLE TO THE PUBLIC AT THESE LOCATIONS. THE DRAFT PFS AND THE PROPOSED PLAN WERE AVAILABLE FOR PUBLIC REVIEW AND COMMENT FROM OCTOBER 3, 1988 TO OCTOBER 24, 1988. A PUBLIC MEETING WAS HELD ON OCTOBER 17, 1988 TO DISCUSS THE FINDINGS OF THE PHASE I RI AND PFS, AND TO PRESENT THE PROPOSED PLAN. TWO FORMAL PUBLIC COMMENTS WERE RECEIVED DURING THE PUBLIC MEETING AND WRITTEN COMMENTS WERE ALSO RECEIVED DURING THE PUBLIC COMMENT PERIOD. ALL COMMENTS RECEIVED DURING THE COMMENT PERIOD AND US EPA'S RESPONSES ARE INCLUDED IN THE ATTACHED RESPONSIVENESS SUMMARY. THE PROVISIONS OF SECTIONS 113(K)(2)(I-V) AND 117 OF CERCLA RELATING TO COMMUNITY RELATIONS HAVE BEEN SATISFIED.

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IV. SCOPE OF OPERABLE UNIT

A CONTAMINANT PLUME, COMPOSED MAINLY OF TCE, EXISTS IN THE WEST WELL FIELD AND IS BEING DRAWN TOWARD CW6 DUE TO PUMPAGE. THE APPARENT SOURCE AREA IS LOCATED TO THE SOUTH, ON OR NEAR CURRENT MARATHON ELECTRIC PROPERTY.

UNTIL RECENTLY, CW6, WHICH THE CITY PUMPED DIRECTLY INTO BOS CREEK AS WASTE (SUBSEQUENTLY CONTAMINATING BOS CREEK), SERVED AS A BLOCKING WELL TO THE REST OF THE WEST WELL FIELD. THE DISCHARGE OF CW6 TO BOS CREEK HAS RESULTED IN A CONTAMINATED GROUNDWATER MOUND BETWEEN THE SOURCE AREA AND CW6. THE INFLUENCE OF THE GROUNDWATER MOUND MAY NOT HAVE FULLY PENETRATED THE GLACIAL OUTWASH AQUIFER, BUT PHASE I RI DATA SUGGEST THAT THE MOUND SERVED EFFECTIVELY TO DIVIDE THE WEST WELL FIELD CONTAMINANT PLUME INTO NORTHERN AND SOUTHERN PORTIONS, INDICATING THAT CONTAMINANT MIGRATION FROM THE SOURCE AREA HAS BEEN SLOWED.

IN SUMMER 1988 THE CITY OF WAUSAU PLACED CW6 BACK IN SERVICE AFTER COMPLETION OF A TRANSPORT PIPE TO CARRY CONTAMINATED WATER TO THE AIR STRIPPER. BECAUSE OF THIS, THE PUMPING RATE OF CW6 HAS INCREASED SUBSTANTIALLY, AND THE UNTREATED DISCHARGE TO BOS CREEK HAS BEEN DISCONTINUED. THESE TWO FACTORS TEND TO INCREASE THE RATE OF MIGRATION FROM THE SOURCE AREA TOWARD CW6. WATER FROM CW6 IS TREATED FOR VOC REMOVAL USING THE EXISTING AIR STRIPPERS AT THE WATER UTILITY. HOWEVER, IF NO FURTHER ACTION IS TAKEN, CW6 WILL CONTINUE TO SERVE AS AN INTERCEPTOR WELL, PROVIDING THE SOLE PROTECTION FOR THE REMAINING WELLS IN THE WEST WELL FIELD.

THE SCOPE OF THIS OPERABLE UNIT IS LIMITED TO THE CONTAMINANT PLUME IMPACTING THE WEST WELL FIELD AND CW6. ULTIMATELY, THE SOLUTION TO PROTECTING THE WEST WELL FIELD WILL INVOLVE ADDITIONAL CONTROLS TO PREVENT CONTAMINANTS FROM MIGRATING TO THE NORTH FROM THE SOURCE AREA. DUE TO THE APPARENTLY SLOWED CONTAMINANT MIGRATION TO THE NORTH CAUSED BY DISCHARGE OF CW6 TO BOS CREEK, ADDITIONAL PROTECTION OF THE WEST WELL FIELD IS POSSIBLE BY PREVENTING OR LIMITING THE EXTENT OF FUTURE CONTAMINANT MOVEMENT TO THE NORTH. IMPLEMENTATION OF PLUME MIGRATION CONTROLS WILL EFFECTIVELY LIMIT THE TIME DURING WHICH CW6 DRAWS IN CONTAMINANTS, THEREBY ALSO LIMITING THE PERIOD DURING WHICH WATER CONSUMERS ARE EXPOSED TO TRACE LEVELS OF CONTAMINANTS.

AN EXPEDITED OPERABLE UNIT REMEDIAL ACTION IS DESIRABLE FROM A PUBLIC HEALTH STANDPOINT. TAKING ACTION NOW RATHER THAN WAITING FOR THE FINAL ACTION WILL SHORTEN THE TIME REQUIRED TO ACHIEVE LONG-TERM PROTECTION OF THE WATER SUPPLY. THIS EXPEDITED OPERABLE UNIT REMEDIAL ACTION IS THEREFORE CONSIDERED TO BE CONSISTENT WITH ACHIEVING A FINAL SITE REMEDY.

THE PFS EVALUATED ALTERNATIVES TO ADDRESS PLUME MIGRATION CONTROL IN THE WEST WELL FIELD OF THE SITE. A DISCUSSION OF REMEDIAL ACTION OBJECTIVES AND GOALS, AS WELL AS A DESCRIPTION AND EVALUATION OF ALTERNATIVES DEVELOPED, IS INCLUDED IN SECTION VII OF THIS DOCUMENT.

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V. CURRENT SITE STATUS AND SITE CHARACTERISTICS

A. CURRENT SITE STATUS

A RI/FS IS CURRENTLY BEING CONDUCTED FOR US EPA BY ITS CONTRACTOR, WARZYN ENGINEERING, INC. THE RI ENTAILED TWO PHASES OR FIELD SAMPLING EVENTS. PHASE I OF THE RI FIELD WORK WAS CONDUCTED FROM AUGUST THROUGH JANUARY 1988, RESULTS OF WHICH ARE SUMMARIZED IN THE APRIL 1988 TECHNICAL MEMORANDUM. PHASE II OF THE RI FIELD WORK WAS CONDUCTED FROM JUNE TO SEPTEMBER 1988. RESULTS OF THIS PHASE OF WORK WILL BE INCLUDED IN THE RI REPORT FOR THE SITE WHICH IS CURRENTLY BEING PREPARED. THE FINAL FS, WHICH ADDRESSES REMEDIATION OF THE ENTIRE SITE, IS UNDER DEVELOPMENT. THE PFS PREPARED FOR THIS OPERABLE UNIT REMEDIAL ACTION ADDRESSES ONLY A LIMITED PORTION OF THE SITE, THE WEST WELL FIELD PLUME, AND IS DISCUSSED IN DETAIL LATER IN THIS DOCUMENT. THE PFS WAS COMPLETED IN SEPTEMBER 1988.

CURRENTLY BEING DEVELOPED, THE FS WILL DETAIL THE DEVELOPMENT AND EVALUATION OF AN ARRAY OF REMEDIAL ACTION ALTERNATIVES TO ADDRESS THE ENTIRE WAUSAU GROUNDWATER CONTAMINATION SITE AND SOURCES IMPACTING IT.

B. SITE CHARACTERISTICS

1. HYDROGEOLOGY

THE CITY PRODUCTION WELLS ARE LOCATED WITHIN GLACIAL OUTWASH AND ALLUVIAL SEDIMENTS UNDERLYING AND ADJACENT TO THE WISCONSIN RIVER. THE AQUIFER IS LOCATED WITHIN A BEDROCK VALLEY WHICH IS UNDERLAIN AND LATERALLY BOUNDED BY RELATIVELY IMPERMEABLE IGNEOUS BEDROCK. GROUNDWATER FLOW WITHIN THE UNCONFINED GLACIAL AQUIFER HAS BEEN DRASTICALLY CHANGED BY THE INSTALLATION OF THE PRODUCTION WELLS. UNDER NON-PUMPING CONDITIONS, GROUNDWATER FLOWS TOWARD THE WISCONSIN RIVER AND ITS TRIBUTARIES (BOS CREEK). GROUNDWATER NATURALLY DISCHARGES AT THE SURFACE WATER BODIES. HOWEVER, UNDER PUMPAGE CONDITIONS, GROUNDWATER FLOWS TOWARD THE PRODUCTION WELLS. THE NATURAL GROUNDWATER FLOW DIRECTIONS ARE FREQUENTLY REVERSED DUE TO CITY WELL PUMPING WHICH INDUCES RECHARGE OF SURFACE WATER INTO THE AQUIFER. THE HORIZONTAL FLOW IN THE VICINITY OF THE WELL FIELD IS INDICATED BY THE POTENTIOMETRIC CONTOURS SHOWN IN FIGURE 4.

THE POTENTIOMETRIC SURFACE MAP ALSO INDICATES THAT THE CONE OF DEPRESSION FROM THE EAST WELL FIELD APPEARS TO

AFFECT GROUNDWATER FLOW BELOW AND TO THE WEST OF THE WISCONSIN RIVER. MONITORING WELL NESTS LOCATED AT MARATHON ELECTRIC INDICATE VERY SLIGHT DOWNWARD GRADIENTS ADJACENT TO THE WISCONSIN RIVER. BELOW THE WISCONSIN RIVER, THE EAST WELL FIELD PRODUCTION WELL PUMPAGE HAS INDUCED SURFACE WATER RECHARGE OF THE AQUIFER, CAUSING FLOW DOWNWARD THROUGH THE RIVER BED AND TOWARD CW3.

AQUIFER HYDRAULIC CONDUCTIVITY TESTS PERFORMED DURING THE PHASE I RI INVESTIGATION INDICATED HYDRAULIC CONDUCTIVITY VALUES RANGING FROM 1.7 X 10-4 CM/SEC TO 8.1 X 10-2 CM/SEC. THE OVERALL AVERAGE HYDRAULIC CONDUCTIVITY OF THE OUTWASH AQUIFER IS APPROXIMATELY 2.2 X 10-2 CM/SEC, BASED ON TEST DATA AT MONITORING WELLS.

2. CHEMICAL CHARACTERISTICS

A. GROUNDWATER QUALITY

GROUNDWATER QUALITY SAMPLING CONDUCTED DURING THE PHASE I INVESTIGATION HAS IDENTIFIED A VERTICAL AND LATERAL DISTRIBUTION OF TOTAL CHLORINATED ETHENES WHICH SUGGEST THAT A MINIMUM OF THREE SOURCES ARE AFFECTING THE CITY WELL FIELD. THE ESTIMATED AREAL DISTRIBUTION OF TOTAL CHLORINATED ETHENES IS SHOWN ON FIGURE 5. THE DISTRIBUTION IS BASED ON A COMBINATION OF DATA OBTAINED FROM LABORATORY VOC ANALYSES OF ROUND 1 GROUNDWATER SAMPLES (OCTOBER 1987) AND FIELD LABORATORY ANALYSES OF GROUNDWATER SAMPLES COLLECTED DURING DRILLING (OCTOBER AND NOVEMBER 1987).

WEST SIDE MONITORING WELLS APPEAR TO DELINEATE A DEEP (GREATER THAN 100 FOOT) NORTH-SOUTH TRENDING TCE PLUME. BASED ON THE VERTICAL DISTRIBUTION OF TCE THROUGHOUT THE AQUIFER IN THE VICINITY OF THE OLD CITY LANDFILL AND THE PRESENCE OF TCE IN THE UNSATURATED ZONE IN THIS AREA, A SOURCE APPEARS TO BE LOCATED WITHIN THE NORTHERN PORTION OF THE FORMER CITY (OF WAUSAU) LANDFILL. THE PLUME APPEARS TO HAVE MIGRATED NORTHWARD, UNDER INFLUENCE OF PUMPAGE FROM CW6. THE HIGHEST TCE CONCENTRATION (4200 UG/L) WITHIN THIS PLUME WAS DETECTED APPROXIMATELY 550 FEET SOUTH OF CW6.

TCE WAS ALSO OBSERVED IN THE SHALLOW AQUIFER BETWEEN BOS CREEK AND CW6. THIS PLUME IS SHOWN ON FIGURE 5 BY THE LIGHTLY SCREENED CONTOURS BETWEEN BOS CREEK AND CW6. THE SHALLOW AQUIFER TCE CONTAMINATION APPEARS TO RESULT FROM THE INDUCED INFILTRATION OF SURFACE WATER FROM BOS CREEK, WHICH HAS BEEN CONTAMINATED BY THE DISCHARGE FROM CW6. THE INDUCED SURFACE WATER RECHARGE OF THE AQUIFER IS EVIDENT FROM THE DOWNWARD VERTICAL GRADIENTS AT MONITORING WELL NESTS IN THAT AREA. BASED ON LABORATORY ANALYSES OF SAMPLES COLLECTED DURING OCTOBER 1987, TCE CONCENTRATIONS ADJACENT TO THE CW6 DISCHARGE WERE ABOVE 100 UG/L. TCE CONCENTRATIONS IN THE PONDED AREA DOWNSTREAM WERE APPROXIMATELY 70 UG/L. TCE WAS NOT DETECTED IN SURFACE WATER SAMPLES COLLECTED UPSTREAM OF THE CW6 DISCHARGE, NOR WAS IT DETECTED AT THE POINT OF DISCHARGE OF BOS CREEK TO THE WISCONSIN RIVER.

THE DISTRIBUTION OF TCE IN MONITORING WELLS LOCATED BETWEEN THE WISCONSIN RIVER AND CW3 SUGGEST EASTWARD MIGRATION OF A DEEP TCE PLUME BELOW THE WISCONSIN RIVER FROM THE VICINITY OF THE FORMER CITY LANDFILL (REFER TO FIGURE 5). TCE APPEARS TO BE VERTICALLY DISTRIBUTED THROUGHOUT THE AQUIFER IN THE VICINITY OF THE OLD CITY LANDFILL, INDICATING CLOSE PROXIMITY TO THE SOURCE AREA. SLIGHT VERTICAL DOWNWARD GRADIENTS WERE OBSERVED IN MONITORING WELLS IN THE AREA. THE HIGHEST CONCENTRATIONS OF TCE WERE DETECTED AT A DEPTH OF APPROXIMATELY 115 FEET. AFTER MOVING INTO THE DEEPER PORTION OF THE AQUIFER, A PORTION OF THE PLUME APPEARS TO MIGRATE EASTWARD UNDER THE INFLUENCE OF PUMPAGE FROM CW3 (REFER TO FIGURE 4). A PART OF THE PLUME HAS ALSO BEEN CAPTURED BY THE PUMPAGE FROM CW6 AND APPEARS TO MIGRATE NORTHWARD UNDER THE INFLUENCE OF THIS WELL. THE TCE-CONTAMINATED PORTION OF THE AQUIFER APPEARS TO BE LESS THAN 20 FEET THICK AND IS LATERALLY RESTRICTED TO A RELATIVELY NARROW FLOW PATH INTO THE PRODUCTION WELLS. SINCE CW6 PRODUCES WATER NEARLY EQUALLY FROM ALL SIDES OF THE 50 FOOT SCREENED INTERVAL, THE RESULTING DILUTION FACTOR APPEARS TO RANGE FROM 15 TO 25. THUS, CONCENTRATIONS OBSERVED AT THE SUPPLY WELL ARE LIKELY TO BE 15 TO 25 TIMES LESS THAN ACTUAL IN PLUME CONCENTRATION.

B. SOURCE LOCATION

THE PREDOMINANT SOURCE OF TCE CONTAMINATION TO CW6 AND CW3 APPEARS TO BE THE MARATHON ELECTRIC/FORMER CITY LANDFILL AREA. ELEVATED CONCENTRATIONS OF TCE WERE DETECTED IN GROUNDWATER, SOIL, AND SOIL GAS SAMPLES OBTAINED FROM THE NORTHERN PORTION OF THE LANDFILL. SOIL GAS CONCENTRATIONS WITHIN THE LANDFILL RANGE FROM

BELOW MINIMUM DETECTION LIMITS (1.0 UG/L) TO APPROXIMATELY 82 UG/L. SOIL SAMPLES OBTAINED FROM BORING IN THE VICINITY OF THE LANDFILL CONTAIN CONCENTRATIONS OF APPROXIMATELY 200 UG/KG. GROUNDWATER SAMPLES OBTAINED FROM THE WATER TABLE IN THE VICINITY OF THE LANDFILL INDICATE TCE CONCENTRATIONS RANGING FROM 16 UG/L TO APPROXIMATELY 1900 UG/L. ALSO DETECTED IN THE VICINITY OF THE LANDFILL WERE 1,1,1-TRICHLOROETHANE (TCA), 1,2-DICHLOROETHENE (1,2-DCE), CHLOROFORM, AND CARBON TETRACHLORIDE AT CONCENTRATIONS GENERALLY BELOW 100 UG/L. POTENTIAL SOURCES WITHIN THE LANDFILL WERE INVESTIGATED IN GREATER DETAIL DURING THE PHASE II RI, AND WILL BE EVALUATED DURING THE FINAL FS.

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VI. SUMMARY OF SITE RISKS

THE RISKS ASSOCIATED WITH THE WEST WELL FIELD CONTAMINANT PLUME HAVE BEEN EVALUATED IN THE PFS FOR THIS OPERABLE UNIT. THIS EFFORT ENTAILED IDENTIFICATION OF CONTAMINANTS, ROUTES OF MIGRATION OF POPULATIONS EXPOSED TO THE CONTAMINANTS ASSOCIATED WITH THE WEST WELL FIELD. THIS INFORMATION WAS THEN USED TO ESTIMATE HEALTH RISKS BASED ON EXPOSURE LEVELS AND TOXICOLOGIC DATA OF THE CONTAMINANTS. THE FINAL FS WILL CONTAIN A COMPREHENSIVE ASSESSMENT OF RISK FOR THE ENTIRE SITE.

THE PREDOMINANT CONTAMINANT IDENTIFIED IN THE GROUNDWATER IN THE WEST WELL FIELD IS TCE. THE EXPOSURE PATHWAY OF CONCERN IS THE CITY'S WATER SUPPLY. THE CITY WATER DISTRIBUTION SYSTEM SUPPLIES POTABLE WATER, DERIVED EXCLUSIVELY FROM THE WAUSAU GROUNDWATER SOURCE AQUIFER, TO APPROXIMATELY 33,000 RESIDENTS. ROUTES OF EXPOSURE TO RESIDENTS THROUGH CONTAMINATED GROUNDWATER INCLUDE INGESTION VIA DRINKING AND COOKING, AS WELL AS INHALATION AND DERMAL EXPOSURE WHILE BATHING. DURING THE PERIOD OF 1982 THROUGH MID-1984, PRIOR TO PUMPING CW6 DIRECTLY INTO BOS CREEK AND THE INSTALLATION OF THE VOC STRIPPERS, LEVELS OF TCE SAMPLED AT VARIOUS DRINKING WATER TAPS THROUGHOUT THE WATER DISTRIBUTION SYSTEM RANGED FROM APPROXIMATELY 10 TO 100 UG/L. PCE AND DCE WERE PERIODICALLY DETECTED, BUT USUALLY BELOW MINIMUM DETECTABLE LIMITS. PRESENTLY, THE CITY TREATS WATER FROM CW6 PRIOR TO DISTRIBUTION USING AN AIR STRIPPER. MONITORING IN THE DISTRIBUTION SYSTEM INDICATES UNDETECTABLE LEVELS OF TCE (DETECTION LIMIT 0.5 UG/L).

BECAUSE TCE IS THE PREDOMINANT CONTAMINANT PRESENT, IT WAS IDENTIFIED AS THE INDICATOR CONTAMINANT, OR CONTAMINANT OF CONCERN, FOR THE WEST WELL FIELD. THE TOXICOLOGICAL EFFECTS OF TCE, INCLUDING ACUTE EXPOSURE, SUBCHRONIC EXPOSURE, AND CARCINOGENIC RISK, WERE EVALUATED.

BASED ON UNDETECTABLE LEVELS OF TCE PRESENT IN THE TREATED WATER WITHIN THE CITY WATER DISTRIBUTION SYSTEM, THE SHORT-TERM CARCINOGENIC RISKS TO HEALTH ASSOCIATED WITH TCE CONTAMINATION WOULD APPEAR TO BE MINIMAL UNDER CURRENT WATER USAGE PRACTICES. THE LONG-TERM CANCER RISK ASSOCIATED WITH CITY WATER USE IS MORE DIFFICULT TO QUANTIFY. THE US EPA HAS SET A MAXIMUM CONTAMINANT LEVEL (MCL) OF 5 UG TCE/L OF DRINKING WATER. MCLS ARE ENFORCEABLE STANDARDS PROMULGATED UNDER THE SAFE DRINKING WATER ACT. BECAUSE TCE IS CARCINOGENIC AND IS NOT CONSIDERED TO BE WITHOUT HAZARD BELOW A GIVEN THRESHHOLD, THE US EPA HAS SET A NON-ENFORCEABLE MAXIMUM CONTAMINANT LEVEL GOAL (MCLG) OF ZERO FOR TCE IN DRINKING WATER.

PROTECTION OF RESIDENTS FROM EXPOSURE TO TCE IS DEPENDENT ON ADEQUATE TREATMENT OF THE WATER. THE POTENTIAL FOR EXPOSURE EXISTS IN THAT FAILURE OF THE TREATMENT SYSTEM COULD RESULT IN AN EXPOSURE PATHWAY THROUGH THE CITY'S DRINKING WATER. IN ADDITION, IF CW6 WAS TURNED OFF, THE TCE CONTAMINANT PLUME WOULD MIGRATE NORTH, IMPACTING THE REMAINING CLEAN WELLS, CW7 AND CW9, IN THE CITY WELL FIELD.

BASED ON THE POSSIBILITY OF FAILURE OF CW6 AND/OR THE AIR STRIPPERS, A POTENTIAL FUTURE RISK OF EXPOSURE TO TCE VIA DRINKING WATER INGESTION EXISTS AT THE SITE. THEREFORE, PLUME MIGRATION CONTROL TO MITIGATE FUTURE RISKS IS CONSIDERED A PRUDENT RESPONSE ACTION TO ADDRESS SITE RISKS. THIS ACTION WILL MITIGATE POTENTIAL LONG-TERM RISKS FROM MIGRATION OF CONTAMINANTS IN WATER AND WILL BE CONSISTENT WITH THE FINAL REMEDY FOR THE SITE.

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VII. DESCRIPTION OF ALTERNATIVES

A. RESPONSE OBJECTIVES

THE PHASED FEASIBILITY STUDY WAS INITIATED TO EVALUATE ALTERNATIVES FOR REMEDIATION OF THE WEST WELL FIELD

CONTAMINANT PLUME. BASED ON THE RISK ASSESSMENT, TWO PRIMARY SITE-SPECIFIC RESPONSE OBJECTIVES WERE IDENTIFIED; 1) PROTECTION FROM LONG-TERM EXPOSURE TO LOW LEVELS OF TCE FROM INGESTION OF DRINKING WATER; AND, 2) PROTECTION FROM FUTURE INCREASED LEVELS OF CONTAMINANTS TO THE WEST WELL FIELD.

A VARIETY OF TECHNOLOGIES TO ADDRESS RESPONSE OBJECTIVES WERE IDENTIFIED FOR FURTHER CONSIDERATION. FROM THESE, FOUR ALTERNATIVES WERE DEVELOPED AND SUBJECTED TO DETAILED ANALYSIS USING THE NINE EVALUATION CRITERIA DEVELOPED UNDER THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA). TABLE 2 LISTS THE FOUR ALTERNATIVES.

B. TREATMENT

GROUNDWATER TREATMENT WAS INCORPORATED INTO EACH OF THE ALTERNATIVES, (EXCEPT NO ACTION) AS A RESULT OF TECHNOLOGY-BASED EFFLUENT LIMIT REQUIREMENTS. SECTION 301(B)(2) OF THE CLEAN WATER ACT AND FEDERAL REGULATIONS (40 CFR 122.44(A)) REQUIRE THE CONSIDERATION AND USE OF THE BEST AVAILABLE TECHNOLOGY (BAT) THAT IS ECONOMICALLY ACHIEVABLE FOR TREATING WATER PRIOR TO DISCHARGE. CORRESPONDING STATE REQUIREMENTS ARE FOUND IN SECTION 147.04, WISCONSIN STATUTES AND CHAPTERS NR 215 AND 217, OF THE WISCONSIN ADMINISTRATIVE CODE.

THE MAXIMUM OBSERVED IN-PLUME CONTAMINATION CONCENTRATIONS ARE LOWER THAN EITHER ACUTE OR AVAILABLE CHRONIC TOXICITY VALUES FOR EFFLUENT LIMITS FOR DISCHARGE TO SURFACE WATERS. EXTRACTION WELLS WOULD EXERT A HYDRAULIC INFLUENCE RADIALLY AND THROUGHOUT THE SATURATED THICKNESS OF THE AQUIFER, DRAWING IN BOTH UNCONTAMINATED AND CONTAMINATED GROUNDWATER, THEREBY LOWERING CONTAMINANT CONCENTRATIONS IN EXTRACTED WATER (RELATIVE TO IN-PLUME CONCENTRATIONS) AS A RESULT OF DILUTION. TREATMENT WOULD THEREFORE NOT BE REQUIRED AS A RESULT OF WATER QUALITY-BASED EFFLUENT LIMITS.

THE ACUTE AND CHRONIC TOXICITY NUMBERS LISTED IN TABLE 3 (BELOW) FOR THE THREE MAJOR WEST SIDE PLUME CONTAMINANTS ARE CURRENTLY BEING CONSIDERED BY THE WISCONSIN DNR IN DETERMINING EFFLUENT LIMITS FOR DISCHARGE TO SURFACE WATERS. THE NUMBERS ARE BEING USED PENDING PROMULGATION OF NEW WISCONSIN ADMINISTRATIVE CODE CHAPTERS REGULATING THE DISCHARGE OF TOXIC SUBSTANCES.

THE ACUTE TOXICITY VALUES ARE ESSENTIALLY END-OF-PIPE EFFLUENT LIMITS, BECAUSE THESE VALUES ARE NOT TO BE EXCEEDED WITHIN THE MIXING ZONE. THE CHRONIC TOXICITY VALUES ARE NOT TO BE EXCEEDED IN THE STREAM AFTER MIXING. TO CALCULATE ALLOWABLE EFFLUENT LIMITS BASED ON CHRONIC TOXICITY, A MASS BALANCE IS PERFORMED USING UPSTREAM, DISCHARGE, AND DOWNSTREAM FLOW RATES AND CONCENTRATIONS.

GROUNDWATER TREATMENT REQUIRED UNDER THE CLEAN WATER ACT IS DETERMINED ON A CASE-BY-CASE BASIS PURSUANT TO SECTION 402(A)(1), USING THE GUIDELINES OF 40 CFR 125.3. SOME FLEXIBILITY IS ALLOWED IN DETERMINING APPROPRIATE TREATMENT TECHNOLOGY IN A PARTICULAR APPLICATION. THE FINAL DETERMINATION REGARDING SPECIFIC TECHNOLOGIES WILL BE MADE BY WDNR DURING THE DESIGN PHASE. THE TREATMENT SYSTEM CHOICE REQUIRES JUSTIFICATION BASED ON LITERATURE DATA AND/OR BENCH OR PILOT SCALE TESTING THAT DEMONSTRATES EFFECTIVE PERFORMANCE.

THE TREATMENT TECHNOLOGY USED FOR THE PURPOSES OF ALTERNATIVE EVALUATION AND DEVELOPMENT OF COST ESTIMATES IN THE PFS IS AIR STRIPPING UTILIZING A PACKED TOWER STRIPPER. AIR STRIPPING IS EFFECTIVE FOR THE TYPES OF CONTAMINANTS IN THE GROUNDWATER AT THIS SITE. HOWEVER, A BAT-EQUIVALENT TREATMENT COULD BE PROVIDED BY A PASSIVE VOC STRIPPING SYSTEM, AND ITS USE WILL BE EVALUATED AS BAT BY THE WDNR DURING THE DESIGN PHASE OF THE REMEDY.

C. ALTERNATIVES

ALTERNATIVE 1 - NO ACTION

UNDER THIS ALTERNATIVE, NO RESPONSE ACTION WOULD BE TAKEN AT THIS TIME TO PROTECT THE UNCONTAMINATED MUNICIPAL WELLS IN THE WEST WELL FIELD OR TO REDUCE THE AMOUNT OF TIME THAT CW6 DRAWS IN CONTAMINANTS.

PRODUCTION WELL CW6 IS NOW ON LINE AS A WATER SUPPLY WELL. THE DISCHARGE TO BOS CREEK HAS BEEN HALTED. BASED ON COMMUNICATIONS WITH WATER UTILITY REPRESENTATIVES, CW6 WILL BE PUMPED NEARLY CONTINUOUSLY AT A RATE OF APPROXIMATELY 1600 GPM DURING THE HIGH-DEMAND SUMMER MONTHS AND POSSIBLY AT A LOWER RATE DURING OTHER

TIMES OF THE YEAR. CONTAMINANTS WILL CONTINUE TO BE DRAWN TO THE NORTH UNDER THE INFLUENCE OF CW6 PUMPAGE. WATER FROM PRODUCTION WELL CW6 IS BEING TREATED AT THE WATER UTILITY FOR VOC REMOVAL USING AN EXISTING STRIPPING TOWER.

FIGURE 6A SHOWS A SIMULATED PIEZOMETRIC HEAD CONTOUR MAP FOR THE NO ACTION ALTERNATIVE UNDER SUMMERTIME PUMPING CONDITIONS OF 11 CUBIC FEET PER SECOND (CFS) TOTAL FLOW. A PIEZOMETRIC SURFACE DIVIDE TRENDING NORTHEAST TO SOUTHWEST WOULD BE CREATED. THIS DIVIDE WOULD EXTEND FROM THE SOUTHERN PORTION OF MARATHON ELECTRIC TOWARD GILBERT PARK TO THE NORTHEAST. THE APPARENT SOURCE AREA LOCATED ON MARATHON ELECTRIC PROPERTY IS LOCATED ON THE DIVIDE. THE INFLUENCE OF THE WEST WELL FIELD PUMPING WELLS EXTENDS TO THE SOURCE AREA. CONTAMINANTS WOULD BE DRAWN TO THE NORTH FROM THE SOURCE AREA INTO THE WEST WELL FIELD. UNDER THESE CONDITIONS, CW6 WOULD FUNCTION AS AN INTERCEPTOR WELL, CAPTURING CONTAMINANTS DRAWN TOWARD THE WEST WELL FIELD. BOTH THE DEEP AND SHALLOW CONTAMINANT PLUMES (SEE FIGURE 5) ARE WITHIN THE ZONE OF INFLUENCE OF CW6. WITHOUT ANY OTHER CONTROLS, THIS SITUATION WOULD CONTINUE UNTIL THE WEST SIDE CONTAMINANT PLUME HAS BEEN EFFECTIVELY PURGED FROM THE AQUIFER BY PRODUCTION WELL PUMPING.

COMPARISON OF FIGURES 7A AND 7B SHOWS THE EFFECT OF TAKING CW6 OFF LINE. FIGURE 7A REFLECTS THE SAME CONDITIONS DISCUSSED ABOVE. FIGURE 7B SHOWS SIMULATED PIEZOMETRIC HEAD CONTOURS WITH CW6 OFF AND THE TOTAL SUMMER PRODUCTION WELL PUMPAGE OF 11 CFS MAINTAINED. THE PIEZOMETRIC SURFACE DIVIDE IS SHIFTED SLIGHTLY TO THE NORTH, REFLECTING A RELATIVELY GREATER INFLUENCE OF WEST WELL FIELD PRODUCTION WELLS. THE SOURCE AREA AND WEST SIDE PLUMES WOULD BE WITHIN THE ZONE OF INFLUENCE OF CW7 AND CW9.

IF CW6 CEASED PUMPING, CONTAMINANTS WOULD BE EXPECTED TO MIGRATE FURTHER NORTH UNDER THE INFLUENCE OF CW7 AND CW9 PUMPAGE. THERE WOULD BE NO PROVISION FOR PROTECTING UNCONTAMINATED CW7 AND CW9 IN THE EVENT OF A FAILURE THAT RESULTS IN SUBSTANTIAL DOWN TIME FOR CW6.

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR THE NO ACTION ALTERNATIVE ARE SUMMARIZED IN TABLE 4. THE ONLY ARARS IDENTIFIED ARE FEDERAL DRINKING WATER STANDARDS AND WISCONSIN CHAPTER NR 140 STANDARDS AND REQUIREMENTS. DRINKING WATER MCLS CAN BE MET AS A RESULT OF VOC REMOVAL AT THE WATER TREATMENT PLANT.

UNDER THE NO ACTION ALTERNATIVE, THERE WOULD BE NO TIME ASSOCIATED WITH IMPLEMENTATION HOWEVER, THE TIME DURING WHICH WATER CONSUMERS WOULD BE EXPOSED TO TRACE (LESS THAN DETECTABLE) LEVELS OF CONTAMINANTS IN DRINKING WATER WOULD BE MAXIMIZED. A SINGLE CITY WATER SUPPLY WELL (CW6) WOULD BE RELIED ON TO DRAW CONTAMINANTS FROM THE SOURCE AREA AND FROM THE AQUIFER ON THE WEST SIDE, PREVENTING FURTHER NORTHWARD CONTAMINANT MIGRATION TO OTHER WEST WELL FIELD WATER SUPPLY WELLS.

THERE IS NO COST OR OPERATION AND MAINTENANCE (O&M) ASSOCIATED WITH THE NO ACTION ALTERNATIVE. ANNUAL COSTS TO OPERATE THE PRESENT AIR STRIPPER WERE NOT CONSIDERED AS O&M UNDER THIS ALTERNATIVE.

ALTERNATIVE 2 - EXTRACTION WELL NORTH OF BOS CREEK

ALTERNATIVE 2 INVOLVES INSTALLATION OF A GROUNDWATER EXTRACTION WELL NORTH OF BOS CREEK AND SOUTH OF CW6. GROUNDWATER WOULD BE TREATED AND DISCHARGED TO THE WISCONSIN RIVER.

THE EXTRACTION WELL WOULD BE LOCATED IN THE VICINITY OF SCHOFIELD PARK ON A CITY-OWNED PARCEL AT THE NORTHWEST CORNER OF THE INTERSECTION OF RANDOLPH AND BUREK STREETS (SEE FIGURE 8). THIS PLACES THE WELL NEAR THE APPARENT CENTER OF THE CONTAMINANT PLUME WHICH WOULD BE THE MOST EFFECTIVE LOCATION. THE WELL WOULD SERVE TO REMOVE CONTAMINANTS FROM THE NORTHERN PORTION OF THE TCE PLUME, AND WOULD DRAW IN AND INTERCEPT CONTAMINANTS FROM THE SOUTH. BASED ON INFORMATION GATHERED TO DATE, THE PLUME IS ESTIMATED TO BE APPROXIMATELY 500 FEET WIDE AND 20 FEET THICK IN THAT AREA, AND IT APPEARS TO BE WITHIN APPROXIMATELY 50 FEET OF THE BEDROCK BASE OF THE AQUIFER. A DEEP WELL WOULD THEREFORE BE USED.

GROUNDWATER FLOW MODEL RESULTS INDICATE A GROUNDWATER PIEZOMETRIC SURFACE DIVIDE WOULD BE CREATED BETWEEN THE EXTRACTION WELL AND CW6 (SEE FIGURE 6B). THE DIVIDE WOULD BE LOCATED BETWEEN BURNS AND RANDOLPH STREETS. CONTAMINANTS LOCATED NORTH OF THE DIVIDE WOULD MIGRATE TOWARD CW6, AND CONTAMINANTS LOCATED SOUTH OF THE DIVIDE WOULD MIGRATE TO THE EXTRACTION WELL. THE INFLUENCE OF THE EXTRACTION WELL ALSO EXTENDS SOUTH TO INCLUDE THE APPARENT SOURCE AREA. THE EXTRACTION WELL WOULD THEREFORE DRAW IN CONTAMINANTS FROM THE SOURCE

AREA.

A CONCEPTUAL SYSTEM LAYOUT FOR THE NORTHERN EXTRACTION, TREATMENT, AND DISCHARGE SYSTEM IS ILLUSTRATED ON FIGURE 8. A WELL AND PUMP HOUSE ARE LOCATED ON CITY-OWNED PROPERTY NEAR THE INTERSECTION OF RANDOLPH AND BUREK STREET. SECTION A-A (FIGURE 9) SHOWS THAT A 130 FOOT WELL WITH A 40 FOOT LONG, 20 INCH DIAMETER SCREEN WOULD BE CONSTRUCTED. A SMALL PUMP HOUSE WOULD BE CONSTRUCTED AT THE WELL HEAD TO PROTECT THE WELL HEAD, MOTOR STARTER AND CONTROLS, AND ABOVE GROUND PIPING. ABOVE GROUND PIPING WOULD INCORPORATE A CHECK VALVE, FLOW CONTROL VALVE, SAMPLING TAP AND TOTALIZER FLOW. A PACKAGE TOWER STRIPPER INCORPORATING AN ABOVE-GROUND DISCHARGE SLUMP WOULD BE LOCATED ON A CONCRETE PAD NEXT TO THE WELL HOUSE. THE TOWER PAD WOULD BE SURROUNDED BY A CHAIN LINK FENCE WITH A LOCKING GATE. FOR A 1500 GPM DESIGN FLOW AND A STRIPPING FACTOR OF 0.2, A 7 FOOT DIAMETER TOWER WITH 15 FEET OF 3.5 INCH NOMINAL SIZE POLYETHYLENE PALL RING PACKING WOULD PROVIDE AN ESTIMATED 85% REMOVAL OF TCE. TREATED EFFLUENT WOULD FLOW BY GRAVITY TO THE DISCHARGE LINE AND ULTIMATELY TO AN OUT-FALL AT THE WISCONSIN RIVER SHORELINE. THE BAT REQUIREMENT WILL BE DETERMINED BY THE WDNR DURING THE DESIGN PHASE OF THE PROJECT.

ARARS FOR ALTERNATIVE 2 ARE SUMMARIZED IN TABLE 5. THE ACTION WOULD COMPLY WITH NR 140 REQUIREMENTS. IN GENERAL, THE HIGHEST CONTAMINANT CONCENTRATIONS OBSERVED IN THE WEST SIDE PLUME ARE LESS THAN EFFLUENT LIMITS (5.2 MG/L FOR TCE) ESTABLISHED BY THE WDNR, SO WATER QUALITY-BASED REQUIREMENTS CAN BE SATISFIED. TECHNOLOGY-BASED EFFLUENT LIMITS CAN BE SATISFIED WITH THE VOC STRIPPING TECHNOLOGY.

PROBABLE COSTS OF ALTERNATIVE 2 ARE SUMMARIZED IN TABLE 6. MAJOR CAPITAL COST ITEMS INCLUDE THE EXTRACTION WELL, PUMP HOUSE, STRIPPING TOWER AND FOUNDATION, CONTROLS AND UTILITIES, PIPING AND PIPING APPURTENANCES. MAJOR OPERATION AND MAINTENANCE COST ITEM INCLUDE ENERGY COSTS, SAMPLING AND MONITORING, ANALYTICAL LABORATORY, ROUTINE SYSTEMS INSPECTION AND MAINTENANCE, AND REPORTING. CAPITAL COSTS ARE ESTIMATED TO BE $432,000. THE FIRST-YEAR OPERATION AND MAINTENANCE COSTS ARE ESTIMATED TO BE $105,000, AND ANNUAL OPERATION AND MAINTENANCE COSTS FOR SUBSEQUENT YEARS ARE ESTIMATED TO BE $82,000. THE FIVE-YEAR PRESENT NET WORTH (10% DISCOUNT RATE) ASSOCIATED WITH THE ABOVE COSTS IS $760,000.

RESPONSE OBJECTIVES WOULD BEGIN TO BE MET SHORTLY AFTER THE WELL BEGINS PUMPING. CONTAMINANTS NOT CAPTURED BY THE SYSTEM WOULD BE DRAWN TO CW6, AND CONTAMINATED WATER WOULD BE TREATED AT THE CITY WATER TREATMENT PLANT TO MEET DRINKING WATER MCLS. A DESIGN AND CONSTRUCTION PERIOD OF LESS THAN SIX MONTHS IS CONSIDERED REALISTIC FOR THIS ACTION. RISK TO WATER CONSUMERS ARE MINIMIZED BY THE TIME IT TAKES FOR CW6 TO DRAW IN CONTAMINANTS PRESENTLY SITUATED BEYOND THE NORTHERN EXTENT OF INFLUENCE OF THE EXTRACTION WELL.

IMPLEMENTATION OF THIS ALTERNATIVE IS NOT EXPECTED TO BE A PROBLEM. THE TECHNOLOGY IS READILY AVAILABLE, CONVENTIONAL, AND WELL DEMONSTRATED. CONSTRUCTION IS STRAIGHT FORWARD AND NO UNUSUAL FEATURES ARE ANTICIPATED TO BE REQUIRED FOR THE SYSTEM. COORDINATION BETWEEN US EPA AND THE CITY OF WAUSAU WILL BE REQUIRED TO ACCOMPLISH IMPLEMENTATION OF THE SYSTEM.

ALTERNATIVE 3 - EXTRACTION WELL SOUTH OF BOS CREEK

UNDER ALTERNATIVE 3, A GROUNDWATER EXTRACTION WELL WOULD BE CONSTRUCTED SOUTH OF BOS CREEK. GROUNDWATER WOULD BE EXTRACTED, TREATED AND DISCHARGED TO THE WISCONSIN RIVER.

THE EXTRACTION WELL WOULD BE LOCATED NEAR THE CENTER OF THE SOUTHERN PORTION OF THE PLUME AND NORTH OF THE APPARENT TCE SOURCE AREA. A LOCATION NEAR THE SOUTHEAST CORNER OF THE EASTERN-MOST MARATHON ELECTRIC COMPANY BUILDING WOULD BE SUITABLE, BASED ON AVAILABLE INFORMATION (SEE FIGURE 8). THE PLUME APPEARS TO BE RELATIVELY WIDE IN THIS AREA, AND CONTAMINATION HAS BEEN OBSERVED THROUGHOUT MOST OF THE 130 FOOT SATURATED THICKNESS OF THE AQUIFER (SEE FIGURE 5). THE CONCENTRATION OF CHLORINATED ETHENES (PRIMARILY TCE) RANGES FROM APPROXIMATELY 500 UG/L TO 2,000 UG/L IN THIS AREA, BASED ON PHASE I RI RESULTS. A DEEP WELL WOULD BE USED TO REMOVE CONTAMINANTS FROM THE SOUTHERN PORTION OF THE PLUME, AND DRAW SOME CONTAMINANTS BACK TO THE SOUTH, AWAY FROM CW6.

GROUNDWATER FLOW MODELING WAS CONDUCTED TO EVALUATE THE EFFECTS OF PUMPING FROM THE SOUTHERN EXTRACTION WELL. MODELING RESULTS INDICATE THAT A DIVIDE IN THE GROUNDWATER PIEZOMETRIC SURFACE WOULD BE CREATED BETWEEN THE EXTRACTION WELL AND CW6. FIGURE 6C SHOWS THAT A DIVIDE TRENDING FROM WEST-NORTHWEST TO EAST-SOUTHEAST WOULD BE LOCATED IN THE VICINITY OF BOS CREEK AND RANDOLPH STREET. CONTAMINANTS LOCATED IN ROUGHLY THE NORTHERN

ONE-HALF OF THE WEST SIDE CONTAMINANT PLUME WOULD MIGRATE TOWARD CW6. CONTAMINANTS LOCATED SOUTH OF THE CONTAMINANT PLUME WOULD BE DRAWN TO THE EXTRACTION WELL. FIGURE 6C SHOWS THAT A SECOND DIVIDE IS LOCATED BENEATH THE WISCONSIN RIVER. CONTAMINANTS NEAR THE SOURCE AREA WOULD BE PREVENTED FROM MIGRATING AWAY FROM THE SOURCE TO THE EAST OR NORTH. AN EXTRACTION WELL AT THIS LOCATION ACCOMPLISHES CONTROL OF CONTAMINANT MIGRATION AWAY FROM THE SOURCE TO BOTH THE EAST AND WEST WELL FIELDS, WHILE CAPTURING A LARGE PORTION OF THE WEST SIDE CONTAMINANT PLUME.

A CONCEPTUAL SYSTEM LAYOUT FOR THE SOUTHERN GROUNDWATER EXTRACTION AND DISCHARGE SYSTEM IS SHOWN OF FIGURE 8. A WELL AND PUMP HOUSE ARE LOCATED ON MARATHON ELECTRIC PROPERTY EAST AND SLIGHTLY NORTH OF THE SOUTHEAST CORNER OF THE MARATHON ELECTRIC MANUFACTURING BUILDING. SECTION B-B (FIGURE 10) SHOWS THAT A 150 FOOT, 16 INCH DIAMETER WELL WITH A 60 FOOT SCREEN WOULD BE CONSTRUCTED. A SMALL PUMP HOUSE WOULD BE CONSTRUCTED AT THE WELL HEAD AND A STRIPPING TOWER WOULD BE PROVIDED. APPROXIMATELY 220 FEET OF BURIED GRAVITY DISCHARGE PIPING WOULD THEN EXTEND SOUTH ACROSS MARATHON ELECTRIC PROPERTY TO AN EXISTING STORM SEWER MANHOLE. A 42-INCH STORM SEWER DROPS FROM THE MANHOLE TO AN OUT FALL AT THE WISCONSIN RIVER SHORELINE.

ARARS FOR ALTERNATIVE 3 ARE SUMMARIZED IN TABLE 5. THE ACTION WOULD COMPLY WITH NR 140 REQUIREMENTS. STATE GROUNDWATER QUALITY STANDARDS APPLY TO THE ALTERNATIVE. DRINKING WATER STANDARDS (MCLS) FOR VOCS CAN BE ACHIEVED BY TREATMENT OF WATER FROM CW6 AT THE CITY WATER TREATMENT PLANT. THE HIGHEST CONTAMINANT CONCENTRATIONS OBSERVED IN THE WEST SIDE CONTAMINANT PLUME ARE LESS THAN EFFLUENT LIMITS, SO WATER QUALITY-BASED EFFLUENT LIMITS CAN BE SATISFIED. TECHNOLOGY-BASED EFFLUENT LIMITS CAN BE SATISFIED WITH THE VOC STRIPPING TECHNOLOGY. THE BAT REQUIREMENT WILL BE DETERMINED BY THE WDNR DURING THE DESIGN PHASE OF THE PROJECT.

PROBABLE COSTS FOR ALTERNATIVE 3 ARE SUMMARIZED IN TABLE 7. MAJOR CAPITAL COST ITEMS INCLUDE THE EXTRACTION WELL, PUMP HOUSE, STRIPPING TOWER AND FOUNDATION, CONTROLS AND UTILITIES, TRENCHING, PIPING AND PIPING APPURTENANCES. MAJOR OPERATION AND MAINTENANCE COST ITEMS INCLUDE ENERGY COSTS, SAMPLING AND MONITORING, ANALYTICAL LABORATORY SERVICES, ROUTINE SYSTEMS INSPECTION AND MAINTENANCE, AND REPORTING. CAPITAL COSTS ARE ESTIMATED TO BE $422,000. THE FIRST YEAR OPERATION AND MAINTENANCE COSTS ARE ESTIMATED TO BE $105,000 AND ANNUAL OPERATION AND MAINTENANCE COSTS FOR SUBSEQUENT YEARS ARE ESTIMATED TO BE $81,000. THE FIVE-YEAR PRESENT NET WORTH (10% DISCOUNT RATE) ASSOCIATED WITH THE ABOVE COSTS IS $750,000.

RESPONSE OBJECTIVES WOULD BEGIN TO BE MET SHORTLY AFTER EXTRACTION WELL PUMPING BEGINS. A DESIGN AND CONSTRUCTION PERIOD OF LESS THAN SIX MONTHS IS CONSIDERED REALISTIC FOR THIS ACTION. THE TIME UNTIL LONG-TERM PROTECTION IS ACHIEVED DEPENDS ON THE TIME REQUIRED FOR CW6 TO DRAW IN CONTAMINANTS FROM THE NORTHERN HALF OF THE WEST SIDE CONTAMINANT PLUME AND FROM THE SHALLOW GROUNDWATER PLUME CAUSED BY THE DISCHARGE OF CW6 INTO BOS CREEK.

IMPLEMENTATION OF THIS ALTERNATIVE IS NOT EXPECTED TO BE A PROBLEM. THE TECHNOLOGY IS READILY AVAILABLE, CONVENTIONAL, AND WELL DEMONSTRATED. CONSTRUCTION IS STRAIGHT FORWARD AND NO UNUSUAL FEATURES ARE ANTICIPATED TO BE REQUIRED FOR THE SYSTEM. COORDINATION BETWEEN US EPA, WDNR, THE CITY OF WAUSAU, AND MARATHON ELECTRIC COMPANY WILL BE REQUIRED TO ACCOMPLISH IMPLEMENTATION OF THE SYSTEM.

ALTERNATIVE 4 - EXTRACTION WELLS NORTH AND SOUTH OF BOS CREEK

ALTERNATIVE 4 IS ESSENTIALLY A COMBINATION OF ALTERNATIVES 2 AND 3. TWO EXTRACTION WELLS WOULD BE USED: ONE NORTH AND ONE SOUTH OF BOS CREEK. THIS SYSTEM WOULD PROVIDE PLUME CAPTURE TO THE NORTH, AND SOURCE AREA GROUNDWATER REMOVAL TO THE SOUTH. EXTRACTED GROUNDWATER WOULD BE TREATED AT EACH LOCATION AND DISCHARGED TO THE WISCONSIN RIVER.

GROUNDWATER FLOW MODELING WAS CONDUCTED TO EVALUATE THE EFFECTS OF PUMPING SIMULTANEOUSLY FROM THE NORTHERN AND SOUTHERN EXTRACTION WELLS. WELL LOCATIONS ARE SHOWN ON FIGURE 8. GROUNDWATER FLOW MODELING RESULTS INDICATE TWO DIVIDES IN THE GROUNDWATER PIEZOMETRIC SURFACE WOULD BE CREATED IN THE WEST SIDE CONTAMINANT PLUME AREA. ONE DIVIDE WOULD BE LOCATED BETWEEN THE NORTHERN EXTRACTION WELL AND CW6, AND A SECOND DIVIDE WOULD BE LOCATED BETWEEN THE NORTHERN AND SOUTHERN EXTRACTION WELLS. FIGURE 6D SHOWS THE LOCATIONS OF THE DIVIDES. THE NORTHERN DIVIDE RUNS APPROXIMATELY EAST-WEST AND IS LOCATED BETWEEN RANDOLPH AND BURNS STREETS.

PLUME CAPTURE WOULD BE ACCOMPLISHED SUCH THAT CONTAMINANTS IN THE NORTHERN ONE-THIRD OF THE PLUME WOULD BE

DRAWN IN BY CW6. CONTAMINANTS IN THE CENTRAL PORTION OF THE DEEP WEST SIDE PLUME WOULD BE CAPTURED BY THE NORTHERN EXTRACTION WELL. A PORTION OF THE SHALLOW CONTAMINANT PLUME WOULD ALSO BE DRAWN IN BY THIS WELL. CONTAMINANTS NEAR THE SOURCE AREA AND SOUTHERN PORTION OF THE DEEP WEST SIDE PLUME WOULD BE CAPTURED BY THE SOUTHERN EXTRACTION WELL.

THE PIEZOMETRIC SURFACE IS LOCATED BENEATH THE WISCONSIN RIVER. THIS INDICATES THE EXTRACTION SYSTEM WOULD BE EFFECTIVE IN CONTROLLING THE POTENTIAL MIGRATING OF CONTAMINANTS TO THE EAST WELL FIELD. COMPARISON OF FIGURES 7C AND 7D SHOWS THE EFFECT OF A SHUTDOWN OF CW6 FOR ALTERNATIVE 4. FIGURE 7C SHOWS A PIEZOMETRIC SURFACE CONTOUR MAP FOR THE ALTERNATIVE 4 SYSTEM WITH CW3, CW6, CW7, AND CW9 PUMPING AT A COMBINED RATE OF 1437 GPM (11 CFS). FIGURE 9D SHOWS A CORRESPONDING MAP FOR ALTERNATIVE 4 WITH CW6 OFF-LINE AND CW3, CW4, CW7, AND CW9 PUMPING AT THE COMBINED RATE OF 1437 GPM. WITH CW6 OFF-LINE, THE NORTHERN EXTENT OF INFLUENCE OF THE EXTRACTION SYSTEM IS SHIFTED A FEW HUNDRED FEET TO THE NORTH, AS INDICATED BY THE EAST-WEST DIVIDE LOCATED SLIGHTLY SOUTH OF BURNS STREET. CONTAMINANTS LOCATED NORTH OF THIS DIVIDE WOULD BE DRAWN TOWARD CW7 AND CW9.

CONCEPTUAL SYSTEM LAYOUTS FOR THE GROUNDWATER EXTRACTION, TREATMENT, AND DISCHARGE SYSTEM ARE SHOWN ON FIGURE 8. THE CROSS SECTION FOR THE TWO SYSTEMS ARE SHOWN ON FIGURES 9 AND 10. THE DETAILS OF EACH SYSTEM HAVE BEEN DISCUSSED PREVIOUSLY.

RESPONSE OBJECTIVES WOULD BE MET SHORTLY AFTER THE WELLS BEGIN PUMPING. CONTAMINANTS NOT CAPTURED BY THE SYSTEM WOULD BE DRAWN INTO CW6.

A DESIGN AND CONSTRUCTION PERIOD OF LESS THAN SIX MONTHS IS CONSIDERED REALISTIC FOR THIS ACTION. THE TIME UNTIL RISKS TO WATER CONSUMERS ARE MINIMIZED WOULD BE THE TIME REQUIRED FOR CW6 TO DRAW IN CONTAMINANTS IN THE PLUME BEYOND THE INFLUENCE OF THE NORTHERN EXTRACTION WELL.

ARARS FOR ALTERNATIVE 4 ARE SUMMARIZED IN TABLE 5. THE ACTION WILL COMPLY WITH NR 140 REQUIREMENTS. STATE GROUNDWATER QUALITY STANDARDS APPLY TO THE ALTERNATIVE. DRINKING WATER STANDARDS CAN BE MET (MCLS) FOR VOCS BY TREATMENT AT THE CITY WATER TREATMENT PLANT. THE HIGHEST CONTAMINANT CONCENTRATIONS OBSERVED IN THE WEST SIDE PLUME ARE LESS THAN EFFLUENT LIMITS, SO WATER QUALITY-BASED EFFLUENT LIMITS CAN BE SATISFIED. TECHNOLOGY-BASED EFFLUENT LIMITS CAN BE SATISFIED WITH THE VOC STRIPPING TECHNOLOGY. THE BAT REQUIREMENT WILL BE DETERMINED BY THE WDNR DURING THE DESIGN PHASE OF THE PROJECT.

PROBABLE COSTS FOR ALTERNATIVE 4 ARE SUMMARIZED IN TABLE 8. MAJOR CAPITAL COST ITEMS INCLUDE THE EXTRACTION WELLS, PUMP HOUSES, STRIPPING TOWER AND FOUNDATION, CONTROL SYSTEMS AND UTILITIES, TRENCHING, AND PIPING. MAJOR O&M ITEMS INCLUDE ENERGY COSTS, SAMPLING AND MONITORING, ANALYTICAL LABORATORY SERVICES, ROUTINE SYSTEMS INSPECTION AND MAINTENANCE, AND REPORTING. CAPITAL COSTS ARE ESTIMATED TO BE $853,000. THE FIRST YEAR OPERATION AND MAINTENANCE COSTS ARE ESTIMATED TO BE $169,000, AND ANNUAL OPERATION AND MAINTENANCE COSTS FOR SUBSEQUENT YEARS ARE ESTIMATED TO BE $140,000. THE FIVE-YEAR PRESENT NET WORTH (10% DISCOUNT RATE) ASSOCIATED WITH THE ABOVE COSTS IS $1,400,000.

AS WITH ALTERNATIVES 2 AND 3, IMPLEMENTATION IS NOT EXPECTED TO BE A PROBLEM. TECHNOLOGIES ARE READILY AVAILABLE AND WELL DEMONSTRATED. COORDINATION BETWEEN US EPA, WDNR, THE CITY OF WAUSAU, AND MARATHON ELECTRIC WOULD BE REQUIRED TO IMPLEMENT THE SYSTEM.

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VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

IN ORDER TO DETERMINE THE MOST APPROPRIATE ALTERNATIVE THAT IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT, ATTAINS ARARS, IS COST-EFFECTIVE, AND UTILIZES PERMANENT SOLUTIONS AND TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE, ALTERNATIVES WERE EVALUATED AGAINST EACH OTHER. COMPARISONS WERE BASED ON THE NINE EVALUATION CRITERIA OUTLINED IN SARA. A SUMMARY OF THE COMPARISON IS PROVIDED IN TABLE 9. FOLLOWING IS A DISCUSSION OF EACH OF THE CRITERIA AND THE ALTERNATIVES' PERFORMANCE AGAINST EACH OF THESE.

1. SHORT-TERM EFFECTIVENESS

EACH OF THE ALTERNATIVES (EXCEPT NO ACTION) IS ACCOMPANIED BY SIMILAR SHORT-TERM RISK TO WORKERS AND THE

COMMUNITY. THESE POTENTIAL RISKS ARE ASSOCIATED WITH EXPOSING CONTAMINATED MATERIALS FROM SUBSURFACE AREAS. ALTERNATIVE 2 USES THE AREA MOST ACCESSIBLE TO THE COMMUNITY, BUT ACCESS CAN BE CONTROLLED. ALTERNATIVE 3 WOULD BE IMPLEMENTED ON PRIVATE PROPERTY, BUT PLANT WORKERS MAY BE NEARBY. ACCESS TO THE CONSTRUCTION AREA CAN BE CONTROLLED. ALTERNATIVE 4 INVOLVES BOTH AREAS. IN ALL THREE CASES, SITE WORKERS CAN BE PROTECTED BY PERSONAL PROTECTION EQUIPMENT. NONE OF THE ALTERNATIVES ARE CONSIDERED TO PRESENT APPRECIABLE RISKS TO POPULATIONS AWAY FROM THE CONSTRUCTION AREAS, AND VAPOR MONITORING CAN BE USED DURING CONSTRUCTION.

RESPONSE OBJECTIVES CAN BE MET BY EACH OF THE ACTION ALTERNATIVES, AND THE DESIRED HYDRAULIC INFLUENCE BY EXTRACTION WELLS IS EXPECTED TO BE REALIZED WITHIN SEVERAL WEEKS OF THE START OF PUMPING. THE EFFECTS OF THE VARIOUS SYSTEMS CAN BE SUMMARIZED AS FOLLOWS.

* ALTERNATIVE 1 - PROVIDES NO ACTIVE REMEDIATION OF THE AQUIFER. CONTAMINANTS WOULD BE DRAWN TO CW6 FROM THE SOURCE AREA. CONTAMINANT MIGRATION TO THE EAST IS ALSO ANTICIPATED AS A RESULT OF CW3 PUMPING.

* ALTERNATIVE 2 - PROVIDES CAPTURE OF APPROXIMATELY THE SOUTHERN TWO-THIRDS OF THE WEST SIDE PLUME. CONTAMINANTS IN ROUGHLY THE NORTHERN THIRD OF THE PLUME WOULD MIGRATE TO CW6. CONTAMINANTS WOULD BE REMOVED FROM THE AQUIFER AS THEY ARE DRAWN AWAY FROM THE SOURCE AND ARE INTERCEPTED BY THE NORTHERN EXTRACTION WELL. THE NORTHERN WELL IS EXPECTED TO HAVE AN INFLUENCE EXTENDING EAST OF THE SOURCE AREA, BENEATH THE WISCONSIN RIVER, THEREBY REDUCING THE POTENTIAL FOR EASTWARD MIGRATION OF CONTAMINANTS.

* ALTERNATIVE 3 - PROVIDES CAPTURE OF APPROXIMATELY THE SOUTHERN HALF OF THE PLUME. MIGRATION OF CONTAMINANTS TO CW6 WOULD ALSO OCCUR UNDER THE ALTERNATIVE. THE SOUTHERN EXTRACTION WELL IS EXPECTED TO HAVE A PRONOUNCED INFLUENCE EXTENDING BENEATH THE WISCONSIN RIVER THEREBY PREVENTING POTENTIAL EASTWARD MIGRATION MORE EFFECTIVELY THAN ALTERNATIVE 2. CONTAMINANTS NEAR THE SOURCE AREA WOULD BE REMOVED BEFORE MIGRATING OFF-SITE, ALTHOUGH THE NORTHERN EXTENT OF INFLUENCE (FOR DRAWING BACK CONTAMINANTS) IS LESS THAN FOR ALTERNATIVE 2.

* ALTERNATIVE 4 - COMBINES ALTERNATIVES 2 AND 3. THE NORTHERN EXTENT OF PLUME CAPTURE WOULD BE SIMILAR TO THAT UNDER ALTERNATIVE 2. REMOVAL OF CONTAMINANTS AND CONTROL OF MIGRATION AWAY FROM THE SOURCE WOULD BE ACCOMPLISHED AS UNDER ALTERNATIVE 3.

UNDER EACH OF THE ALTERNATIVES, CONTAMINATED WATER IN THE NORTHERN SECTION OF THE WEST SIDE PLUME WOULD MIGRATE TO CW6, AND CONTAMINATED WATER WOULD BE TREATED AT THE CITY WATER TREATMENT PLANT FOR REMOVAL OF VOCS.

BECAUSE OF THE DIFFERENCE AMONG THE ALTERNATIVES IN THE AREAS OF EXTRACTION WELL INFLUENCE, THE MAJOR DISTINCTIONS AMONG THE ALTERNATIVES ARE: (1) THE TIME REQUIRED TO ACHIEVE PROTECTION AND (2) CONTROL/CAPTURE OF SOURCE AREA GROUNDWATER.

2. LONG-TERM EFFECTIVENESS AND PERMANENCE

THERE ARE DIFFERENCES IN THE TIME REQUIRED TO ACHIEVE LONG-TERM PROTECTION OF THE PUBLIC WATER SAFETY, AS DISCUSSED ABOVE. HOWEVER, EACH OF THE ALTERNATIVES (INCLUDING NO ACTION) IS EXPECTED TO ACHIEVE LOW CONTAMINANT CONCENTRATIONS (I.E., APPROACHING MCLS AND STATE GROUNDWATER STANDARDS) AS A RESULT OF AQUIFER PURGING. THE LONG-TERM RESIDUAL RISKS ARE THEREFORE SIMILAR FOR EACH OF THE ALTERNATIVES, BUT INTERIM (SHORT-TERM) RISKS ARE DIFFERENT, AS DISCUSSED ABOVE.

THE RELIABILITY OF EACH OF THE ACTION ALTERNATIVES IS SIMILAR. LARGE PORTIONS OF THE WEST SIDE CONTAMINANT PLUME WOULD BE CAPTURED. THE NO ACTION ALTERNATIVE IS LESS RELIABLE, BECAUSE CW6 IS USED AS THE SOLE PROTECTION FOR THE WEST SIDE WELLS. CONTAMINANTS WOULD ALSO MIGRATE TO THE EAST WELL FIELD UNDER THE NO ACTION ALTERNATIVE.

THE TECHNOLOGIES USED IN EACH OF THE ALTERNATIVES ARE RELATIVELY SIMPLE AND RELIABLE. EACH OF THE ALTERNATIVES RELIES ON CW6 INITIALLY AS THE LAST BARRIER TO ADDITIONAL WEST WELL FIELD CONTAMINATION. THE CONSEQUENCES OF FAILURE WOULD BE SIMILAR FOR EACH OF THE ALTERNATIVES, I.E., CONTAMINATED WATER WOULD BE DRAWN TOWARD CW6. IN THE EVENT OF REMEDY FAILURE, RISK TO WATER CONSUMERS SHOULD BE NO GREATER THAN AT PRESENT, AS LONG AS THE CITY KEEPS CW6 IN OPERATION AND MAINTAINS VOC REMOVAL CAPABILITIES AT THE WATER TREATMENT PLANT.

3. REDUCTION IN TOXICITY, MOBILITY AND VOLUME

NO REDUCTION IN TOXICITY, MOBILITY, OR VOLUME OF WASTE OR HAZARDOUS SUBSTANCES ARE ACHIEVED BY ANY OF THE FOUR ALTERNATIVES. SUCH REDUCTION OF TOXICITY, MOBILITY, OR VOLUME IS NOT COST-EFFECTIVE WHEN COMPARED WITH THE EFFECTIVENESS AND RELATIVELY LOWER COST OF AN EXTRACTION WELL AND AIR STRIPPING SYSTEM ALONE, VERSUS A SYSTEM WHICH UTILIZES GRANULAR ACTIVATED CARBON TO CONTROL AIR EMISSIONS, CONSIDERING THE RELATIVELY LOW LEVELS OF CONTAMINANTS TO BE TREATED.

4. IMPLEMENTABILITY

THE INDIVIDUAL TECHNOLOGIES USED IN EACH OF THE ALTERNATIVES ARE CONVENTIONAL AND WELL DEMONSTRATED. NO UNUSUAL DIFFICULTIES IN CONSTRUCTION OF WELLS OR TREATMENT AND DISCHARGE SYSTEMS ARE ANTICIPATED. ALTERNATIVES 3 AND 4 MAY INVOLVE TRENCH EXCAVATION THROUGH RUBBLE IN THE FORMER CITY LANDFILL, BUT THIS DOES NOT APPEAR TO CONSTITUTE A SUBSTANTIAL DISADVANTAGE TO THESE ALTERNATIVES.

THE TECHNOLOGIES AND SERVICES USED UNDER EACH OF THE ALTERNATIVES ARE CONVENTIONAL AND SIMILAR. REQUIRED CONTRACTOR SERVICES FOR EXTRACTION WELL, TREATMENT SYSTEM AND DISCHARGE SYSTEM CONSTRUCTION ARE SIMILAR AND AVAILABLE. EACH ALTERNATIVE REQUIRES A CLEAN WATER SUPPLY FOR WELL CONSTRUCTION, AND COMPLIANT OFF-SITE FACILITIES FOR DISPOSAL OF POSSIBLE DRILL CUTTINGS AND/OR TRENCH SPOILS, AND FOR TREATMENT AND DISPOSAL OF DRILLING FLUIDS, IF REQUIRED. SERVICES AND MATERIALS ARE CONSIDERED TO BE AVAILABLE FOR EACH ALTERNATIVE.

COORDINATION BETWEEN US EPA, WDNR, THE CITY OF WAUSAU, AND, UNDER ALTERNATIVES 3 AND 4, MARATHON ELECTRIC, WOULD BE REQUIRED FOR EACH OF THE ALTERNATIVES. POTENTIAL FUTURE ACTIONS WOULD BE POSSIBLE AND EFFECTIVENESS COULD EASILY BE MONITORED WITH EACH OF THE ALTERNATIVES.

5. COST

ESTIMATED COSTS FOR THE ALTERNATIVES ARE PRESENTED IN TABLES 6 THROUGH 8. MAJOR CAPITAL COST ITEMS FOR EACH ALTERNATIVE INCLUDE EXTRACTION WELL, PUMP HOUSE, STRIPPING TOWER AND FOUNDATION, CONTROL SYSTEMS, UTILITIES, TRENCHING, AND PIPING. MAJOR OPERATION AND MAINTENANCE ITEMS INCLUDE ENERGY COSTS, SAMPLING AND MONITORING, ANALYTICAL LABORATORY SERVICES, ROUTINE SYSTEMS INSPECTION, AND MAINTENANCE AND REPORTING. CAPITAL, ANNUAL OPERATION AND MAINTENANCE, AND FIVE-YEAR PRESENT WORTH COSTS (10% DISCOUNT RATE) ARE SUMMARIZED IN TABLE 9. VARIATION IN COSTS OF MAJOR CAPITAL AND O&M ITEMS DO NOT AFFECT THE COST COMPARISON, BECAUSE SIMILAR ITEMS ARE INCLUDED IN EACH ALTERNATIVE.

6. COMPLIANCE WITH ARARS

AS SHOWN IN TABLE 5, THE SAME ARARS WERE IDENTIFIED FOR EACH OF THE ACTION ALTERNATIVES. STATE GROUNDWATER STANDARDS COULD BE MET IN THE LONG-TERM. DRINKING WATER MCLS CAN BE MET UNDER EACH ALTERNATIVE DUE TO WATER TREATMENT BY THE AIR STRIPPERS PRIOR TO DISTRIBUTION.

TECHNOLOGY-BASED OR WATER QUALITY-BASED EFFLUENT LIMITATIONS CAN BE MET BY EACH OF THE ACTION ALTERNATIVES. OTHER ACTION-SPECIFIC ARARS CAN BE MET BY EACH OF THE ALTERNATIVES. CERCLA EXEMPTS ON-SITE ACTIONS FROM PERMIT REQUIREMENTS, BUT STATE REVIEW OF PLANS WILL BE REQUIRED.

7. OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

SHORT-TERMS RISK ASSOCIATED WITH THE CONTAMINATED WATER SUPPLY CAN BE ADDRESSED BY TREATMENT FOR VOC REMOVAL AT THE WATER TREATMENT PLANT. THE ALTERNATIVES DIFFER IN THEIR ABILITY TO CAPTURE CONTAMINANTS AND IN THE TIME REQUIRED TO ACHIEVE LONG-TERM PROTECTION OF THE WATER SUPPLY AND A RESULTING RISK REDUCTION. ALTERNATIVE 2 IS LESS EFFECTIVE THAN ALTERNATIVE 3 OR 4 IN CONTROLLING SOURCE AREA CONTAMINANTS, BECAUSE ALTERNATIVE 3 AND 4 INCORPORATE SOURCE AREA GROUNDWATER REMOVAL AND ALTERNATIVE 2 DRAWS CONTAMINANTS AWAY FROM THE SOURCE BEFORE THEY ARE CAPTURED. THE TIME REQUIRED UNDER ALTERNATIVES 2 AND 3 WOULD BE LONGER THAN FOR ALTERNATIVE 4. THE NO ACTION ALTERNATIVE WOULD REQUIRE THE LONGEST TIME TO ACHIEVE LONG-TERM PROTECTION.

ULTIMATELY, THE LONG-TERM RESIDUAL RISKS ARE EXPECTED TO BE SIMILAR FOR EACH OF THE ALTERNATIVES. NONE OF THE ACTION ALTERNATIVES ARE ANTICIPATED TO HAVE SUBSTANTIAL ADVERSE EFFECTS ON PUBLIC HEALTH OR THE ENVIRONMENT AS A RESULT OF IMPLEMENTATION. EFFLUENT STANDARDS CAN BE MET TO PROTECT SURFACE WATER QUALITY. EACH OF THE ALTERNATIVES, EXCEPT FOR NO ACTION, COMPLIES WITH ARARS.

8. STATE ACCEPTANCE

THE STATE HAS EXPRESSED FAVOR FOR ALTERNATIVE 3 WITH THE PROVISION FOR IMPLEMENTATION OF AN ADDITIONAL WELL IF ALTERNATIVE 3 DOES NOT ACHIEVE RESPONSE OBJECTIVES FOR THIS OPERABLE UNIT. THE STATE AND US EPA WILL WORK TOGETHER IN DETERMINING WHETHER ALTERNATIVE 3 IS ACHIEVING THE OBJECTIVES. A DISCUSSION ON CRITERIA TO BE USED IN EVALUATING THE PERFORMANCE OF THIS REMEDY IS INCLUDED IN SECTION IX OF THIS DOCUMENT.

9. COMMUNITY ACCEPTANCE

THE CITY OF WAUSAU AND MARATHON ELECTRIC, BOTH OF WHOM ARE PRPS, HAVE EXPRESSED A PREFERENCE FOR ALTERNATIVE 3. HOWEVER, THEY HAVE ALSO EXPRESSED A DESIRE TO IMPLEMENT AN ALTERNATE TREATMENT TECHNOLOGY THAT MEETS THE TECHNOLOGY-BASED REQUIREMENTS OF BAT IN THE CLEAN WATER ACT. THE COMMUNITY IN WAUSAU HAS NOT EXPRESSED A PREFERENCE FOR ANY ALTERNATIVE. SPECIFIC COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND AT THE PUBLIC MEETING FOR THE PROPOSED PLAN ARE ADDRESSED IN THE RESPONSIVENESS SUMMARY INCLUDED WITH THIS DOCUMENT.

SUMMARY OF COMPARISON

UNDER ALTERNATIVE 1 (NO ACTION), CONTAMINANTS WOULD BE PURGED ONLY THROUGH PUMPING OF CW6. NEITHER CONTROL OF EASTWARD CONTAMINANT MIGRATION NOR PROTECTION FROM FURTHER WEST SIDE CONTAMINATION WOULD BE ACHIEVED. THIS ALTERNATIVE IS NOT CONSISTENT WITH THE OBJECTIVES FOR THE INTERIM RESPONSE ACTION AT THE SITE AND IS THEREFORE NOT CONSIDERED A VIABLE OPTION FOR THE SITE.

ALTHOUGH ALTERNATIVES 2, 3, AND 4 PROVIDE SIMILAR RESULTS WHEN EVALUATED AGAINST THE NINE CRITERIA, THERE ARE SOME IMPORTANT DIFFERENCES. ALTERNATIVE 2 PROVIDES THE LEAST AMOUNT OF TIME IN WHICH CONTAMINANTS WILL CONTINUE TO REACH CW6, BUT IT REQUIRES THE LONGEST TIME FOR AQUIFER PURGING. UNDER ALTERNATIVE 4, THE AMOUNT OF TIME CONTAMINANTS WILL MIGRATE TO CITY WELL 6 IS THE SAME, HOWEVER, ALTERNATIVE 4 REQUIRES THE LEAST AMOUNT OF PURGE TIME. ALTERNATIVE 3 HAS AN INTERMEDIATE TIME ASSOCIATED WITH BOTH THESE FACTORS. ALTERNATIVE 2 PROVIDES LESS PROTECTION AGAINST EASTWARD MIGRATION THAN ALTERNATIVES 3 AND 4, AND IT RESULTS IN MOVING CONTAMINATION FROM THE SOURCE AREA FURTHER INTO THE AQUIFER BEFORE CAPTURE BY THE EXTRACTION WELL.

THESE TWO FACTORS, IN ADDITION TO REQUIRING THE LONGEST PURGE TIME OF THE THREE ACTION ALTERNATIVES, MAKES ALTERNATIVE 2 THE LEAST ATTRACTIVE. BETWEEN ALTERNATIVES 3 AND 4, THE PURGE TIME AND COSTS ARE THE MAJOR DIFFERENCES. BECAUSE CW6 IS ACTING AS A CONTAMINANT BARRIER WELL IN THE WEST WELL FIELD, AND THE WATER IS TREATED TO SAFE DRINKING LEVELS, THE SMALL DIFFERENCE IN PURGE TIME BETWEEN ALTERNATIVES 3 AND 4 IS NOT CONSIDERED TO CAUSE ANY ADDITIONAL LONG-TERM HEALTH RISK. THEREFORE, BECAUSE ALTERATIVE 4 IS TWICE AS COSTLY WITHOUT PROVIDING ADDITIONAL PROTECTION, ALTERNATIVE 3 IS CONSIDERED THE COST-EFFECTIVE ALTERNATIVE.

#SRSD

IX. SELECTED REMEDY AND STATUTORY DETERMINATIONS

SECTION 121 OF SARA REQUIRED THAT ALL REMEDIES FOR SUPERFUND SITES BE PROTECTIVE OF HUMAN HEALTH AND THE

ENVIRONMENT, COMPLY WITH ARARS, BE COST-EFFECTIVE, AND UTILIZE PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE. ALTERNATIVE 3, WITH THE MODIFICATION PRESENTED BELOW, IS BELIEVED TO PROVIDE THE BEST BALANCE OF TRADE-OFFS AMONG ALTERNATIVES WITH RESPECT TO THE CRITERIA USED TO EVALUATE REMEDIES. THE MODIFICATION INCLUDES THE IMPLEMENTATION OF AN ADDITIONAL EXTRACTION WELL IF ALTERNATIVE 3 IS UNABLE TO PERFORM AS MODELED, THEREBY FAILING TO MEET THE RESPONSE OBJECTIVES FOR THIS OPERABLE UNIT, AS OUTLINED EARLIER. BASED ON THE EVALUATION OF THE ALTERNATIVES, US EPA AND THE STATE OF WISCONSIN BELIEVE THAT ALTERNATIVE 3 (MODIFIED) WOULD BE PROTECTIVE, ATTAIN ARARS, BE COST-EFFECTIVE, AND WOULD NOT BE INCONSISTENT WITH THE FINAL REMEDY AT THE SITE. THE FINAL REMEDY WILL ATTEMPT TO UTILIZE PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

THE SELECTED REMEDY ENTAILS:

* INSTALLATION OF AN EXTRACTION WELL LOCATED IN THE SOUTHERN PORTION OF THE CONTAMINANT PLUME;

* IMPLEMENTATION OF A TREATMENT SYSTEM FOR REMOVAL OF VOCS;

* DISCHARGE OF THE TREATED WATER TO THE WISCONSIN RIVER; AND,

* PROVISION FOR IMPLEMENTATION OF AN ADDITIONAL WELL, AS NECESSARY.

DETERMINATION OF WHETHER THE INITIAL WELL MEETS THE RESPONSE OBJECTIVES FOR THIS REMEDIAL ACTION WILL BE MADE FOLLOWING START-UP OF THE SYSTEM. CRITERIA USED IN MAKING THIS DETERMINATION INCLUDE:

* THE EXTENT OF THE CONE OF DEPRESSION CREATED BY PUMPING OF THE EXTRACTION WELL;

* THE ABILITY OF THE EXTRACTION WELL TO CAPTURE THE PLUME;

* THE AMOUNT OF VOCS REMOVED BY THE SYSTEM OVER TIME; AND,

* THE SYSTEM'S ABILITY TO PROTECT CW7 AND CW9 FROM CONTAMINANTS, SHOULD CW6 FAIL.

EVALUATION OF THE SYSTEM WILL BE BASED ON DATA COLLECTED FROM EXISTING MONITORING WELLS DURING START-UP AND AFTER THE SYSTEM ACHIEVES STEADY STATE CONDITIONS IN THE AQUIFER.

AS STATED ABOVE, THE REMEDY IS CONSIDERED THE MOST COST-EFFECTIVE REMEDIAL ACTION. IT COMPLIES WITH FEDERAL AND STATE ARARS. IT IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT BY MITIGATING CONTAMINANT MOVEMENT TOWARDS CW6 AND BY PROVIDING PROTECTION AGAINST OPERATIONAL FAILURE OF CW6 OR THE AIR STRIPPER CURRENTLY TREATING WATER FROM CW6. REQUIREMENTS OF SECTION 121(B)(1)(A-G) WHICH HAVE BEEN DETERMINED TO BE APPLICABLE TO THIS OPERABLE UNIT ARE DISCUSSED BELOW. IF A PARTICULAR SECTION IS NOT ADDRESSED, IT WAS DETERMINED NOT TO BE APPLICABLE TO THIS OPERABLE UNIT.

1. PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

BASED ON THE RISK ASSESSMENT DEVELOPED FOR THIS OPERABLE UNIT, CHRONIC EXPOSURE TO LOW LEVELS OF VOCS, AND CONTAMINANT PLUME MIGRATION TO THE WEST WELL FIELD ARE THE IDENTIFIED RISKS ASSOCIATED WITH THE WEST SIDE CONTAMINANT PLUME. IMPLEMENTATION OF AN EXTRACTION WELL IN CLOSE PROXIMITY TO THE SOURCE AREA, AND TREATMENT OF EXTRACTED GROUNDWATER UNDER ALTERNATIVE 3 PROVIDES PROTECTION TO HUMAN HEALTH AND THE ENVIRONMENT BY REDUCING CHRONIC EXPOSURE TO LOW LEVEL VOCS AND PROVIDING ADDITIONAL PROTECTION TO THE WEST WELL FIELD FROM PLUME MIGRATION. AN ADDED BENEFIT OF THIS ALTERNATIVE IS THE CAPTURE OF CONTAMINANTS MIGRATING EASTWARD UNDER THE WISCONSIN RIVER TOWARD CW3.

ADDITIONAL PROTECTION IS ALSO PROVIDED IF ALTERNATIVE 3 DOES NOT PERFORM AS PREDICTED. THE PROVISION FOR IMPLEMENTATION OF ALTERNATIVE 4 IF NECESSARY PROVIDES A BACKUP TO THE SOUTHERN EXTRACTION WELL IN THE EVENT THAT ALTERNATIVE 3 DOES NOT CONTROL PLUME MIGRATION IN THE NORTHERN PART OF THE STUDY AREA.

IMPLEMENTATION OF ALTERNATIVE 3 WILL NOT POSE ANY UNACCEPTABLE SHORT-TERM RISKS OR CROSS-MEDIA IMPACTS TO THE SITE, THE WORKERS, OR THE COMMUNITY.

2. ATTAINMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF ENVIRONMENTAL LAWS

ALTERNATIVE 3 WILL BE DESIGNED TO MEET ALL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) OF FEDERAL AND MORE STRINGENT STATE ENVIRONMENTAL LAWS. TABLE 5 LISTS THE ARARS THAT APPLY TO EACH OF THE ACTION ALTERNATIVES AND THE FOLLOWING DISCUSSION PROVIDES THE DETAILS OF THE ARARS THAT WILL BE MET BY ALTERNATIVE 3.

A. FEDERAL: CLEAN WATER ACT (CWA)

DISCHARGE OF EXTRACTED GROUNDWATER IS SUBJECT TO THE REQUIREMENTS OF THE CLEAN WATER ACT. AMBIENT WATER QUALITY CRITERIA (AWQC) FOR PROTECTION OF FRESHWATER AQUATIC ORGANISMS RELATED TO DISCHARGES TO SURFACE BODIES IS AN ARAR. GENERAL REQUIREMENTS FOR DISCHARGES TO SURFACE WATERS UNDER THE WISCONSIN POLLUTANT DISCHARGE ELIMINATION SYSTEM (WPDES) DISCHARGE REGULATIONS ARE ALSO AN ARAR.

TREATMENT OF EXTRACTED GROUNDWATER PRIOR TO DISCHARGE IS AN ARAR. SECTION 301(B)(2) OF THE CLEAN WATER ACT REQUIRES THE APPLICATION OF BEST AVAILABLE TECHNOLOGY (BAT) ECONOMICALLY ACHIEVABLE TO TREAT POLLUTANTS PRIOR TO DISCHARGE. BAT IS DETERMINED ON A CASE-BY-CASE BASIS BY THE WDNR PURSUANT TO SECTION 402(A)(1) OF THE CLEAN WATER ACT, USING GUIDELINES OUTLINED IN 40 CFR 125.3.

B. FEDERAL: SAFE DRINKING WATER ACT (SDWA)/STATE: CHAPTER NR 109 WISCONSIN ADMINISTRATIVE CODE (WAC)

THE SDWA AND CORRESPONDING STATE STANDARDS SPECIFIES MAXIMUM CONTAMINANT LEVELS (MCLS) FOR DRINKING WATER AT PUBLIC WATER SUPPLIES. SINCE VOCS, AND IN PARTICULAR TCE, ARE REGULATED UNDER THE SDWA MCLS, REQUIREMENTS FOR ACHIEVING MCLS ARE RELEVANT AND APPROPRIATE FOR THIS REMEDIAL ACTION.

C. STATE: CHAPTER NR 140 WAC

WISCONSIN GROUNDWATER PROTECTION ADMINISTRATIVE RULE, CHAPTER NR 140 WAC, REGULATES PUBLIC HEALTH GROUNDWATER QUALITY STANDARDS FOR THE STATE OF WISCONSIN. THE ENFORCEABLE GROUNDWATER QUALITY STANDARD FOR TCE IS 1.8 UG/L. GROUNDWATER QUALITY STANDARDS AS FOUND IN NR 140 WAC ARE ARARS FOR THIS REMEDIAL ACTION.

D. STATE: CHAPTERS NR 102 WAC AND NR 104 WAC

CHAPTERS NR 102 AND NR 104 OF THE WISCONSIN ADMINISTRATIVE CODE REGULATE SURFACE WATER QUALITY STANDARDS AND DISCHARGES OF WASTEWATER TO SURFACE WATER, RESPECTIVELY. UNDER NR 102 WAC, INTERIM VALUES USED FOR ESTABLISHING EFFLUENT LIMITS FOR THE CONTAMINANTS OF CONCERN ARE TBC (TO BE CONSIDERED), FOR THIS REMEDIAL ACTION. NR 104 WAC SETS EFFLUENT LIMITS AND CLASSIFIES SURFACES WATERS IN THE STATE OF WISCONSIN.

E. STATE: CHAPTER NR 112 WAC

CHAPTER NR 112 WAC ADDRESSES WELL CONSTRUCTION AND PUMP INSTALLATION FOR EXTRACTION WELLS WHICH WITHDRAW 70 GPM OR GREATER. REQUIREMENTS UNDER THIS REGULATION WILL BE ADDRESSED DURING THE DESIGN PHASE OF THE REMEDIAL ACTION. ADDITIONAL ACTION-SPECIFIC ARARS PERTAINING TO CONSTRUCTION OF THE REMEDY WILL ALSO BE ADDRESSED DURING DESIGN. THESE INCLUDE, BUT ARE NOT LIMITED TO, ILHR 81-84 WAC, ILHR 50-53 WAC, AND IND 1 AND 6 WAC.

F. STATE: CHAPTERS NR 200, 217, AND 219 WAC

THESE CHAPTERS OF THE WISCONSIN ADMINISTRATIVE CODE COVER DISCHARGE PERMIT APPLICATIONS, EFFLUENT LIMITATIONS, AND MONITORING AND REPORTING REQUIREMENTS FOR DISCHARGE ACTIVITIES TO SURFACE WATER BODIES IN THE STATE. ALL SUBSTANTIVE TECHNICAL REQUIREMENTS UNDER THESE REGULATIONS WILL BE MET FOR THIS REMEDIAL

ACTION.

3. COST-EFFECTIVENESS

ALTERNATIVE 3 AFFORDS A HIGH DEGREE OF EFFECTIVENESS BY PROVIDING PROTECTION FROM CHRONIC LOW LEVEL EXPOSURE OF TCE FOR PRODUCTION WELLS CW3 AND CW6, AS WELL AS PROVIDING PROTECTION FROM PLUME MIGRATION IN THE WEST WELL FIELD. ALTERNATIVE 3 IS THE LEAST COSTLY ALTERNATIVE THAT IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT. THEREFORE, ALTERNATIVE 3 IS CONSIDERED TO BE THE MOST COST-EFFECTIVE ALTERNATIVE THAT IS PROTECTIVE.

4. UTILIZATION OF PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

US EPA AND WDNR BELIEVE THE SELECTED REMEDY IS THE MOST APPROPRIATE ALTERNATIVE FOR MEETING THE RESPONSE OBJECTIVES FOR THIS OPERABLE UNIT. ALL OF THE ALTERNATIVES EVALUATED (EXCEPT NO ACTION) PROVIDE ADEQUATE PROTECTION FROM CHRONIC EXPOSURE TO LOW LEVELS OF TCE AND PROTECTION FROM PLUME MIGRATION. ALTERNATIVE 2 DOES NOT EFFECTIVELY PROVIDE PROTECTION FROM TCE MIGRATION TO THE EAST WELL FIELD, NOR DOES IT PROVIDE FOR CAPTURE OF CONTAMINANTS AT THE SOURCE AREA. ALTERNATIVES 3 AND 4 ARE COMPARABLE WITH RESPECT TO THE NINE CRITERIA WITH THE EXCEPTION OF PURGE TIME AND COSTS. BECAUSE CW6 IS ACTING AS A CONTAMINANT BARRIER WELL FOR THE NORTHERN PORTION OF THE PLUME, AND THE WATER IS TREATED TO SAFE DRINKING LEVELS THROUGH AN EXISTING AIR STRIPPER, THE SMALL DIFFERENCE IN PURGE TIME BETWEEN THE TWO DOES NOT CAUSE ANY APPRECIABLE ADDITIONAL HEALTH RISK. THEREFORE, BECAUSE ALTERNATIVE 4 IS TWICE AS COSTLY WITHOUT PROVIDING ADDITIONAL PROTECTION, ALTERNATIVE 3 IS THE PREFERRED ALTERNATIVE.

EXTRACTION OF THE CONTAMINATED GROUNDWATER IN THE VICINITY OF THE SOURCE AREA WILL ELIMINATE ADDITIONAL LOADING OF CONTAMINANTS TO THE AQUIFER AND WILL EXTRACT CONTAMINANTS IN THE GROUNDWATER. THIS ACTION WILL BE CONSISTENT WITH A FINAL REMEDY TO PERMANENTLY RESTORE THE SOLE-SOURCE AQUIFER. AIR STRIPPING OF EXTRACTED WATER PRIOR TO DISCHARGE IS AN APPROPRIATE TREATMENT CONSIDERING THE LOW LEVELS THAT ARE EXPECTED TO BE FOUND AND RELEASED VIA THE AIR. THE TREATMENT SYSTEM WILL BE DETERMINED BY THE WDNR DURING THE DESIGN PHASE OF THE PROJECT. THEREFORE, THE SELECTED REMEDY PROVIDES THE BEST BALANCE OF TRADE-OFFS WITH RESPECT TO THE NINE CRITERIA AND REPRESENTS THE MAXIMUM EXTENT TO WHICH PERMANENT SOLUTIONS AND TREATMENT ARE PRACTICABLE. THE FINAL REMEDY WILL ATTEMPT TO UTILIZE PERMANENT SOLUTIONS AND ALTERNATE TREATMENT TECHNOLOGIES OR RESOURCE RECOVERY TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE.

5. PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

THE STATUTORY PREFERENCE FOR REMEDIES THAT EMPLOY TREATMENT WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES TOXICITY, MOBILITY, OR VOLUME OF HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT IS NOT SATISFIED. TREATMENT OF EXTRACTED GROUNDWATER TO REDUCE TOXICITY, MOBILITY, OR VOLUME WOULD SEEM TO BE DESIRABLE TO SATISFY THE STATUTORY PREFERENCE. HOWEVER, TREATMENT OF CONTAMINANTS WHICH PERMANENTLY AND SIGNIFICANTLY REDUCES TOXICITY, MOBILITY, OR VOLUME OF HAZARDOUS SUBSTANCES WAS NOT FOUND TO BE PRACTICABLE OR COST-EFFECTIVE WITHIN THE LIMITED SCOPE OF THIS OPERABLE UNIT.

#RS
RESPONSIVENESS SUMMARY

WAUSAU GROUNDWATER CONTAMINATION SITE WAUSAU, WISCONSIN

PURPOSE

THIS RESPONSIVENESS SUMMARY IS DEVELOPED TO DOCUMENT COMMUNITY INVOLVEMENT AND CONCERNS DURING THE DEVELOPMENT OF THE PHASED FEASIBILITY STUDY (PFS) FOR THE WAUSAU GROUNDWATER CONTAMINATION SITE, WAUSAU, WISCONSIN. COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD WERE CONSIDERED IN THE SELECTION OF THE OPERABLE UNIT REMEDIAL ACTION FOR THE SITE. THE RESPONSIVENESS SUMMARY SERVES TWO PURPOSES: IT PROVIDES US EPA WITH INFORMATION ABOUT COMMUNITY PREFERENCES AND CONCERNS REGARDING THE REMEDIAL ALTERNATIVES, AND IT SHOWS MEMBERS OF THE COMMUNITY HOW THEIR COMMENTS WERE INCORPORATED INTO THE DECISION-MAKING PROCESS.

THIS DOCUMENT SUMMARIES THE ORAL COMMENTS RECEIVED AT THE PUBLIC MEETING HELD OCTOBER 17, 1988, AND THE WRITTEN COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD OF OCTOBER 3 TO OCTOBER 24, 1988.

OVERVIEW

THE PREFERRED ALTERNATIVE FOR THE WAUSAU GROUNDWATER CONTAMINATION (WAUSAU) SITE WAS ANNOUNCED TO THE PUBLIC JUST PRIOR TO THE BEGINNING OF THE PUBLIC COMMENT PERIOD. THE PREFERRED ALTERNATIVE INCLUDES:

* INSTALLATION OF A GROUNDWATER EXTRACTION WELL IN THE VICINITY OF THE SOURCE OF THE WEST WELL FIELD CONTAMINANT PLUME;

* TREATMENT OF THE EXTRACTED WATER; AND,

* THE DISCHARGE OF THE TREATED WATER TO THE WISCONSIN RIVER; AND

* A PROVISION FOR IMPLEMENTATION OF AN ADDITIONAL WELL, AS NECESSARY.

JUDGING FROM THE COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD, ALL PARTIES SUPPORT THE EXTRACTION OF CONTAMINATED GROUNDWATER FROM THE WEST WELL FIELD. HOWEVER, CONCERN HAS BEEN EXPRESSED OVER THE TYPE OF TREATMENT SYSTEM TO BE USED PRIOR TO DISCHARGE TO THE WISCONSIN RIVER.

SUMMARY OF PUBLIC COMMENTS AND AGENCY RESPONSES

THE PUBLIC COMMENT PERIOD WAS HELD FROM OCTOBER 3 TO OCTOBER 24, 1988 TO RECEIVE COMMENTS CONCERNING THE DRAFT PHASED FEASIBILITY STUDY (PFS). BECAUSE OF THE SIMILARITIES, INDIVIDUAL COMMENTS HAVE BEEN SUMMARIZED AND GROUPED WHERE APPROPRIATE.

A. COMMENT: THE MAYOR OF WAUSAU, THE WAUSAU CITY COUNCIL PRESIDENT, AND MARATHON ELECTRIC CORPORATION HAVE ALL EXPRESSED CONCERN REGARDING THE TYPE OF TREATMENT SYSTEM TO BE UTILIZED FOR REMOVAL OF VOLATILE ORGANIC COMPOUNDS (VOCS) FROM THE EXTRACTED GROUNDWATER. EACH PARTY INDICATED THAT THEY FAVOR THE IMPLEMENTATION OF A PASSIVE VOLATILIZATION SYSTEM FOR TREATING VOCS, RATHER THAN A FORCED-AIR STRIPPING SYSTEM, BECAUSE OF COST CONSIDERATIONS.

A. RESPONSE: AS DISCUSSED IN THE PFS AND THE RECORD OF DECISION (ROD) FOR THIS OPERABLE UNIT REMEDIAL ACTION, THE CLEAN WATER ACT (CWA) REQUIRES TREATMENT OF THE EXTRACTED GROUNDWATER FOR VOC REMOVAL PRIOR TO DISCHARGE. THIS REQUIREMENT IS NOT BASED ON EFFLUENT LIMITS, BUT RATHER ON THE AVAILABILITY OF TREATMENT TECHNOLOGIES TO REMOVE CONTAMINANTS PRIOR TO DISCHARGE.

THE RESPONSIBILITY FOR REGULATING DISCHARGES UNDER THE CWA HAS BEEN DELEGATED TO THE STATE. THEREFORE, THE TYPE OF TREATMENT THAT WOULD SATISFY THE BAT REQUIREMENT WILL BE DETERMINED BY THE WISCONSIN DEPARTMENT OF NATURAL RESOURCES (WDNR) DURING THE DESIGN PHASE OF THE PROJECT. US EPA CONSERVATIVELY PROPOSED AN AIR STRIPPER FOR TREATMENT OF VOCS IN THE PFS AND ROD ONLY FOR THE PURPOSES OF COST-ESTIMATION, IN ORDER TO COMPLY WITH BAT REQUIREMENTS. HOWEVER, ANOTHER TYPE OF TREATMENT SYSTEM MAY ALSO MEET THE BAT REQUIREMENT. THE EFFECTIVENESS OF A PASSIVE SYSTEM FOR TREATING VOCS WILL BE EVALUATED BY THE WDNR DURING THE DESIGN PHASE OF THE PROJECT.

B. COMMENT: WAUSAU CHEMICAL CORPORATION RECOMMENDED THAT THE PROPOSED REMEDIAL ACTION BE IMPLEMENTED SUCH THAT THE CONTAMINANTS FOUND ON THE EAST SIDE OF THE WISCONSIN RIVER ARE NOT PULLED TO THE WEST SIDE DUE TO PUMPING OF THE PROPOSED EXTRACTION WELL. IT FURTHER RECOMMENDED THAT THE REMEDY MUST REDUCE OR MINIMIZE THE EXISTING MIGRATION OF CONTAMINATION FROM THE WEST SIDE SOURCE(S) TO THE EAST WELL FIELD.

B. RESPONSE: THE CONSIDERATION OF THIS COMMENT IS EMBODIED IN THE SELECTION OF ALTERNATIVE 3, IN THAT THIS ALTERNATIVE IS EXPECTED TO HAVE A SUBSTANTIAL IMPACT ON EASTWARD MIGRATION OF TCE. PUMPING OF THE EXTRACTION WELL, AS OUTLINED IN THE PFS, IS NOT EXPECTED TO INDUCE EAST WELL FIELD CONTAMINANT MIGRATION TO THE WEST WELL FIELD. MODELLING PERFORMED DURING THE PHASED FEASIBILITY STUDY SUPPORTS THIS CONCLUSION. FURTHERMORE, WATER LEVEL MONITORING WILL BE PERFORMED DURING START-UP AND SUBSEQUENT OPERATION OF THE SYSTEM TO ENSURE THAT THE DESIRED PERFORMANCE IS ATTAINED. ANY ADVERSE IMPACTS WILL BE CORRECTED AS NECESSARY.

* THE REGULATION MAY BE SUMMARIZED AS FOLLOWS: FOR ANY DISCHARGE OF CONTAMINANTS TO SURFACE WATER BODIES, THE BEST AVAILABLE TECHNOLOGY (BAT) FOR TREATMENT OF THAT CONTAMINANT THAT IS READILY AVAILABLE AND NOT COST-PROHIBITIVE SHOULD BE APPLIED PRIOR TO DISCHARGE OF THAT WATER.

C. COMMENT: MARATHON ELECTRIC CORPORATION REQUESTED THAT THE ROD ALLOW US EPA TO APPROVE THE USE OF EXTRACTED WATER AS A NON-CONTACT COOLANT IN MARATHON ELECTRIC'S FOUNDRY OPERATIONS.

C. RESPONSE: SINCE THE ABOVE USE OF THE WATER WAS NOT CONSIDERED IN THE FEASIBILITY STUDY, US EPA WOULD NOT SPECIFICALLY ADDRESS THIS REQUEST IN THE ROD. APPROVAL FOR THIS TYPE OF ACTION WOULD BE REQUIRED FROM THE WDNR THROUGH ISSUANCE OF A DISCHARGE PERMIT, AND THUS THE DECISION WILL BE MADE DURING THE DESIGN PHASE OF THE PROJECT.

D. COMMENT: THE CITY OF WAUSAU AND MARATHON ELECTRIC CORPORATION HAVE POINTED OUT THE FACT THAT THEY OFFERED TO IMPLEMENT (A VARIATION OF) THE PREFERRED ALTERNATIVE OVER A YEAR AGO AND ARE CONCERNED WITH THE APPARENT LACK OF ACTION TAKEN SO FAR BY US EPA.

D. RESPONSE: AT THE TIME OF THE PROPOSAL, US EPA FELT THE ACTION WAS PREMATURE DUE TO IDENTIFIED DATA GAPS REGARDING CONTAMINATION PLUMES AND SOURCE AREAS. SPECIFICALLY, THE LOCATION OF THE SOURCE(S) FOR THE WEST WELL FIELD CONTAMINANT PLUME AND THE OCCURRENCE OF TCE MIGRATION BENEATH THE WISCONSIN RIVER HAD YET NOT BEEN IDENTIFIED. FURTHERMORE, US EPA WAS REQUIRED TO EVALUATE PROTECTIVE, COST-EFFECTIVE REMEDIES PRIOR TO UNDERTAKING REMEDIAL ACTION AT SUPERFUND SITES. AT THE TIME OF THE PROPOSAL, NO DEVELOPMENT OR EVALUATION OF ALTERNATIVES HAD BEEN COMPLETED. THE DATA GAPS HAVE NOW BEEN NARROWED, AND US EPA FEELS THAT IT IS PRUDENT TO GO FORWARD WITH THE IMPLEMENTATION OF ALTERNATIVE 3 (MODIFIED).

#TA
TABLES, ATTACHMENTS

TABLE 2

REMEDIAL ACTION ALTERNATIVES

ALTERNATIVE 1	NO ACTION
ALTERNATIVE 2	EXTRACTION WELL LOCATED NORTH OF BOS CREEK, WITH PACKED TOWER STRIPPING AND DISCHARGE TO THE WISCONSIN RIVER.
ALTERNATIVE 3	EXTRACTION WELL LOCATED SOUTH OF BOS CREEK NEAR THE SOURCE AREA, WITH PACKED TOWER STRIPPING AND DISCHARGE TO THE WISCONSIN RIVER.
ALTERNATIVE 4	A COMBINATION OF ALTERNATIVES 2 AND 3.

TABLE 3

WATER QUALITY EFFLUENT LIMITS FOR SURFACE WATER DISCHARGE

OBSERVED COMPOUND	ACUTE	CHRONIC	MAX.
	----------	UG/L	----------
TRANS-1,2-DICHLOROETHENE (DCE)	13,500	NOT AVAIL	641
TRICHLOROETHENE (TCE)	5,200	NOT AVAIL	3,200
TETRACHLOROETHENE (PCE)	528	84	55

TABLE 4
ARARS: ALTERNATIVE 1 - NO ACTION
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

REGULATORY REQUIREMENT	COMMENT
	CHEMICAL-SPECIFIC ARARS
SAFE DRINKING WATER ACT; 40 CFR 141; NR 109 WAC	DRINKING WATER MCLS AND CORRESPONDING STATE STANDARDS FOR HEALTH-RELATED COMPOUNDS ARE RELEVANT AND APPROPRIATE AS GOALS FOR CLEANING UP A PUBLIC WATER SUPPLY SOURCE AQUIFER.
	LOCATION-SPECIFIC ARARS
NO LOCATION-SPECIFIC ARARS WERE IDENTIFIED FOR THE NO ACTION ALTERNATIVE.	
	ACTION-SPECIFIC ARARS
NO ACTION-SPECIFIC ARARS WERE IDENTIFIED FOR THE NO ACTION ALTERNATIVE.	

TABLE 5
ARARS: ACTION ALTERNATIVES 2, 3, AND 4
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

REGULATORY REQUIREMENT	COMMENT
	CHEMICAL-SPECIFIC ARARS
NR 140 WAC	GROUNDWATER QUALITY STANDARDS ARE APPLICABLE. RI/FS PROCESS IS CONSIDERED TO SATISFY SUBSTANTIVE REQUIREMENTS FOR INVESTIGATION, ANALYSIS AND CONSIDERATION OF APPROPRIATE RESPONSE ACTIONS.
CLEAN WATER ACT	GENERAL REQUIREMENT FOR REGULATING DISCHARGES TO SURFACE WATER ARE APPLICABLE. FEDERAL AWQC ARE ARARS, STATE NUMBERS ARE MORE STRINGENT.
NR 102 VAC NR 104 VAC	INTERIM NUMBERS USED IN ESTABLISHING EFFLUENT LIMITS FOR TOXICS ARE TO BE CONSIDERED (TBC).
SAFE DRINKING WATER ACT; 40 CRF 141; NR 109 WAC	DRINKING WATER MCLS AND CORRESPONDING STATE STANDARDS ARE RELEVANT AND APPROPRIATE AS GOALS FOR CLEANING UP A PUBLIC WATER SUPPLY SOURCE AQUIFER.
	LOCATION-SPECIFIC ARARS
CHAPTER 30 STATUTES; NR 115-117 WAC	MAY BE APPLIED ALTHOUGH PROPOSED FACILITIES DO NOT APPEAR TO LIE WITHIN REGIONAL FLOODWAY OR FLOODWAY FRINGE.
	ACTION-SPECIFIC ARARS
CWA SECTION 301; 40 CFR 122 CHAPTER 147.04 STATUTES	TECHNOLOGY-BASED EFFLUENT LIMITS ARE APPLICABLE.
NR 112 WAC	APPLICABLE TO EXTRACTION WELLS.
NR 200 WAC NR 217 WAC	REQUIREMENT FOR APPLICATION FOR DISCHARGE PERMIT AND STATE REVIEW MAY BE A APPLICABLE. REQUIREMENT FOR PERMIT MAY BE WAIVED UNDER CERCLA ON-SITE ACTION EXEMPTION. MONITORING AND REPORTING REQUIREMENTS MAY BE APPLICABLE.
NR 219 WAC	SAMPLING AND TESTING METHODS WOULD BE APPLICABLE FOR MONITORING.
ILHR 81-84 WAC	APPLICABLE TO SYSTEM PIPING.
ILHR 50-53 WAC	APPLICABLE TO PUMP HOUSE.
IND 1, 6 WAC	APPLICABLE TO CONSTRUCTION PHASE FOR WORKER SAFETY.

TABLE 6
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 2
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

ITEM	COST
EXTRACTION WELL	$ 55,000
WELL HOUSE AND UTILITIES	$ 14,000
WELL HOUSE PIPING AND APPURTENANCES	$ 10,000
DISCHARGE SYSTEM	$ 19,000
STRIPPING TOWER, FOUNDATION, APPURTENANCES	$ 150,000
CAPITAL FACILITIES SUBTOTAL	$ 248,000
ENGINEERING DESIGN (25%)	$ 62,000
CONTRACT ADMINISTRATION (10%)	$ 25,000
LEGAL AND ADMINISTRATIVE (10%)	$ 25,000
CAPITAL SUBTOTAL	$ 360,000
CONTINGENCIES (20%)	$ 72,000
CAPITAL TOTAL	$ 432,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	FIRST YEAR	SUBSEQUENT YEARS
WATER LEVELS	$ 4,500	$ 3,600
WATER QUALITY	$ 26,000	$ 8,200
FLOW MONITORING	$ 2,700	$ 2,700
ENERGY	$ 42,000	$ 42,000
GENERAL O&M LABOR	$ 6,000	$ 6,000
REPORTING	$ 3,000	$ 3,000
ADMINISTRATION	$ 3.000	$ 3,000
O&M SUBTOTAL	$ 87,200	$ 68,500
CONTINGENCIES (20%)	$ 17,400	$ 13,500
O&M TOTAL	$ 104,600	$ 82,000

FIVE-YEAR PRESENT WORTH

PRESENT WORTH OF CAPITAL (10% DISCOUNT RATE)	$ 430,000
PRESENT WORTH OF O&M (10% DISCOUNT RATE)	$ 330,000
PRESENT WORTH TOTAL	$ 330,000

TABLE 7
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 3
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

ITEM	COST
EXTRACTION WELL	$ 57,000
WELL HOUSE AND UTILITIES	$ 14,000
WELL HOUSE PIPING AND APPURTENANCES	$ 10,000
DISCHARGE SYSTEM	$ 12,000
STRIPPING TOWER, FOUNDATION, APPURTENANCES	$ 150,000
CAPITAL FACILITIES SUBTOTAL	$ 243,000
ENGINEERING DESIGN (25%)	$ 61,000
CONTRACT ADMINISTRATION (10%)	$ 24,000
LEGAL AND ADMINISTRATIVE (10%)	$ 24,000
CAPITAL SUBTOTAL	$ 352,000
CONTINGENCIES (20%)	$ 70,000
CAPITAL TOTAL	$ 422,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	FIRST YEAR	SUBSEQUENT YEARS
WATER LEVELS	$ 4,500	$ 3,600
WATER QUALITY	$ 26,000	$ 8,200

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FLOW MONITORING	$ 2,700	$ 2,700
ENERGY	$ 42,000	$ 42,000
GENERAL O&M LABOR	$ 6,000	$ 6,000
REPORTING	$ 3,000	$ 2,400
ADMINISTRATION	$ 3,000	$ 2,400
O&M SUBTOTAL	$ 87,200	$ 67,300
CONTINGENCIES (20%)	$ 17,400	$ 13,500
O&M TOTAL	$ 104,600	$ 80,800

FIVE-YEAR PRESENT WORTH

PRESENT WORTH OF CAPITAL (10% DISCOUNT RATE)	$ 420,000
PRESENT WORTH OF O&M (10% DISCOUNT RATE)	$ 330,000
PRESENT WORTH TOTAL	$ 750,000

TABLE 8
SUMMARY OF PROBABLE COSTS: ALTERNATIVE 4
PHASED FEASIBILITY STUDY
WAUSAU WATER SUPPLY NPL SITE
WAUSAU, WISCONSIN

CAPITAL COSTS

ITEM	COST
EXTRACTION WELL	$ 112,000
WELL HOUSE AND UTILITIES	$ 28,000
WELL HOUSE PIPING AND APPURTENANCES	$ 20,000
DISCHARGE SYSTEM	$ 30,000
STRIPPING TOWER, FOUNDATION, APPURTENANCES	$ 300,000
CAPITAL FACILITIES SUBTOTAL	$ 490,000
ENGINEERING DESIGN (25%)	$ 123,000
CONTRACT ADMINISTRATION (10%)	$ 49,000
LEGAL AND ADMINISTRATIVE (LO%)	$ 49,000
CAPITAL SUBTOTAL	$ 711,000
CONTINGENCIES (20%)	$ 142,000
CAPITAL TOTAL	$ 853,000

ANNUAL OPERATION AND MAINTENANCE COSTS

	FIRST YEAR	SUBSEQUENT YEARS
WATER LEVELS	$ 4,500	$ 3,600
WATER QUALITY	$ 32,000	$ 10,000
FLOW MONITORING	$ 3,500	$ 3,500
ENERGY	$ 84,000	$ 84,000
GENERAL O&M LABOR	$ 11,000	$ 11,000
REPORTING	$ 3,000	$ 2,400
ADMINISTRATION	$ 3,000	$ 2,400
O&M SUBTOTAL	$141,000	$117,000
CONTINGENCIES (20%)	$ 28,000	$ 23,000
O&M TOTAL	$169,000	$140,000

FIVE-YEAR PRESENT WORTH

PRESENT WORTH OF CAPITAL (10% DISCOUNT RATE)	$850,000
PRESENT WORTH OF O&M (10% DISCOUNT RATE)	$550,000
PRESENT WORTH TOTAL	$1,400,000